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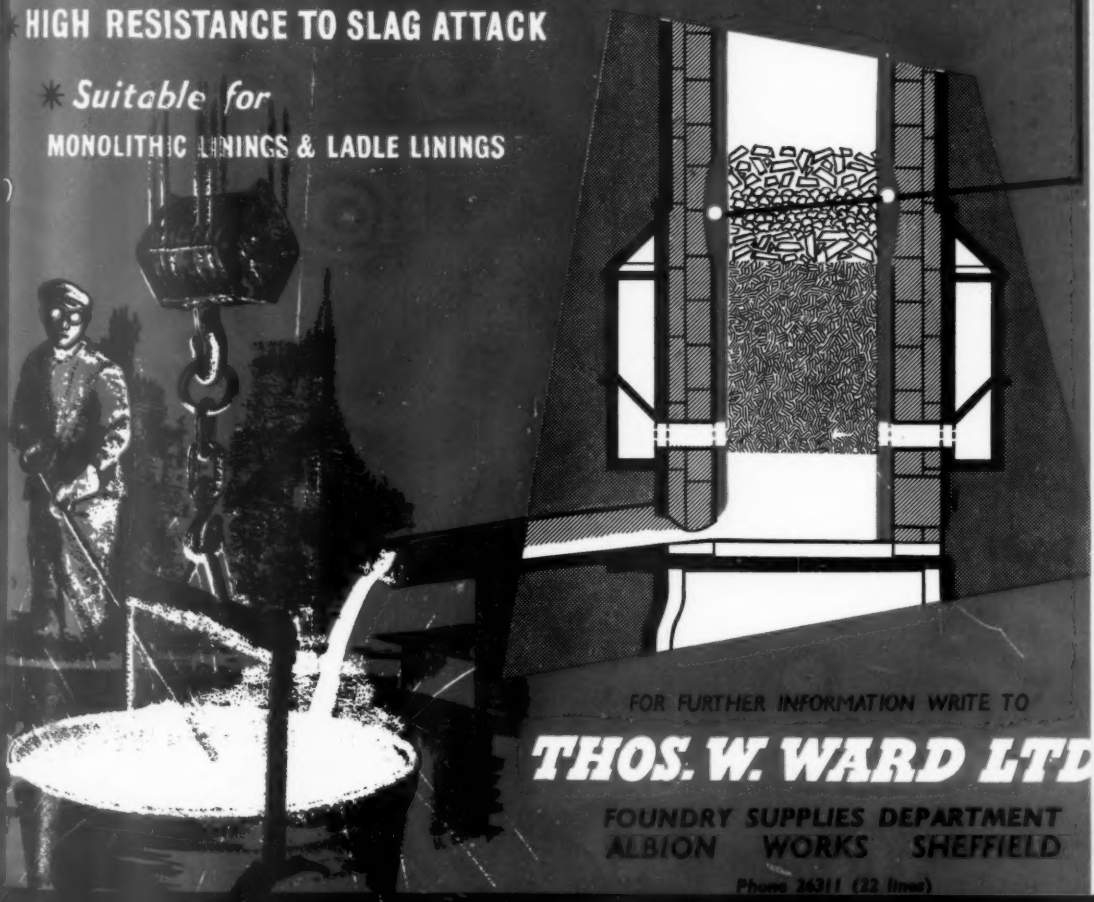

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PRINCIPAL CONTENTS

Page

A Mediæval Masterpiece—the Baptismal Font of St. Bartholomew's Church, Liège

Description from a German source of this unique example of the founder's art, together with an account of the processes and methods most probably adopted in its construction 767

Notes on the History of Patternmaking

By L. Faulkner 771

"Castings Sales Creation" and "Diversity of Production"—Twin Objectives of Ainsbury Foundries, Limited, Oldham

Sound policies and new outlets for castings are revealed in this short account of an enterprising concern 775

Registration of Agreements

By Barrister-at-Law 781

Bellfounders of the West Country—the Pennington Family of Devon and Cornwall 783

Un Chef-d'Oeuvre moyen-âgeux: Le Font Baptismal de St. Bartholomé á Liége.
Description par une source belge de cet exemple unique de l'art des fondeurs, suivi d'un compte-rendu des procédés et méthodes probablement adoptées dans sa construction 767

Notes sur l'Histoire de la Menuiserie de Modéles. Par L. Faulkner 771

Création de Services de Vente pour Piéces moulées et Diversité de la Production—Double Objectif des Fonderies Ainsbury, Ltd., à Oldham.
Des méthodes judicieuses et de nouveaux débouchés pour pièces moulées sont révélés dans ce court mémoire sur une compagnie à l'esprit entreprenant 775

Fondeurs de Cloches dans l'Ouest de l'Angleterre: la Famille Pennington due Devon et de la Cornouaille 783

Ein mittelalterliches Meisterwerk: Das Taufbecken der Sankt Bartholomäuskirche in Lüttich.
Nach einer belgischen Quelle wird dieses einzigartige Beispiel der Giessereikunst beschrieben, worauf eine Darstellung der Verfahren und Methoden folgt, die vermutlich bei seiner Ausführung Anwendung fanden 767

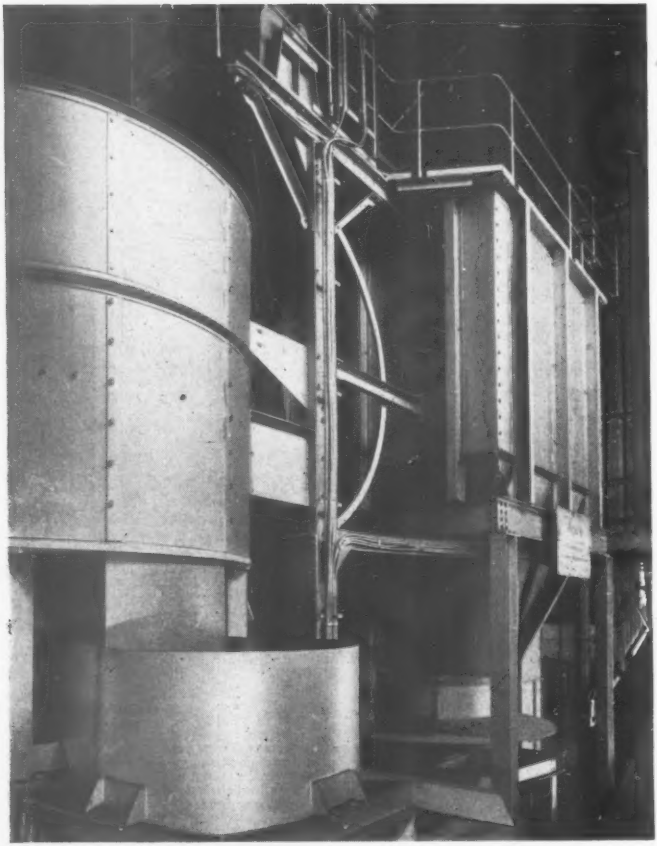
Bemerkungen zur Geschichte des Modellbaues. Von L. Faulkner 771

Förderung des Verkaufes von Gussstücken und Vielseitigkeit der Erzeugung. Die doppelten Ziele der Ainsbury Foundries Ltd., Oldham.
Dieser kurze Bericht über eine unternehmende Firma zeigt eine klardenkende Politik und neue Anwendungsgebiete für Gussstücke 775

Glockengiesser im Western Englands—Die Familie Pennington in Devon und Cornwall 783

Features, News, Commercial Information and Statistics

Leader: Of Importance, in 1958 765
Dinner: Retirement of Dr. Pearce 766
Founders Medals presented at Livery Dinner 766
ISI Translations 770
British Standards Institution 770
New Patents 770
Heat-treatment Plant in Edgar Allen's Foundry 774
Brussels Awards to UK Exhibitors 777
Equipment and Supplies 778
Notes from the Branches 779
Experiments on Core Washes 782
Book Reviews 784
Company News 792



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FOUNDRY
TRADE JOURNAL

Vol. 105 DECEMBER 25, 1958 No. 2202

Of Importance, in 1958

In grey ironfounding, it is sad to relate that an outstanding feature of 1958 was the closing down of a few large jobbing shops attached to important engineering concerns. The reasons are not the same in all cases. Sometimes room is wanted for extra machinery and plant, in other cases, the change is attributed to preference being given to components made by welding or to the belief that the independent jobbing shops can supply castings more cheaply. Whatever the motive, the closures offer a great opportunity for independent founders to enlarge their businesses, but to do so, they must accelerate deliveries by resorting to the newer production methods where these are applicable. Outstanding amongst these is the CO_2 Process.

In considering foundry equipment, the major events of the year were the success of British exhibits at the Cleveland Foundry Show, and the description the JOURNAL made available of Ford's new Thames Foundry. The Thames plant incorporated almost entirely British-made equipment, whilst the former event showed that British designs could make a favourable impact on the American market. This has become clearly apparent from the increasing number of inquiries and "feelers" we have received from overseas for agencies for British-made foundry equipment. Here the situation becomes complicated as most of the larger UK concerns are already represented abroad, whilst other concerns manufacturing equipment under licence have their selling territories limited by agreement. Another important event of the year was the decision taken by the Foundry Trades' Equipment and Supplies Association to organize a purely "foundry" exhibition which in actual fact turns out to be mainly a show of equipment and raw materials. This is to take place next May at Bingley Hall, Birmingham, and has every appearance of being an outstanding success. If hard work can ensure this, then the seventeen committee meetings so far held will not have been in vain.

In steelfounding, the new research station at East Bank Road, Sheffield, became fully operative during the year, and from now on, there will be a continuous flow of useful reports on the various aspects of steelfoundry technology. Armaments are no longer the backbone of this industry and its entry and expansion into other fields warrants concentration on research. The smaller components now cast with precision in steel, and indeed in other metals, has created a demand for one more technical institute to cater for its special requirements and so the British Investment Casters' Technical Association has been formed. This is one field where the foundry industry is expanding.

Dinner

RETIREMENT OF DR. PEARCE

The available accommodation at the Connaught Rooms, London, was fully taken up for the complimentary dinner arranged on Monday, December 15, to mark the retirement of Dr. J. G. Pearce, C.B.E., from the position of director of the British Cast Iron Research Association. The president of the Association, Mr. E. Player, C.B.E., and his lady received the guests supported by Dr. Pearce, with Dr. May Pearce, his wife. Mr. Player also took the chair at the dinner. Others at the top table were Dr. Harold Hartley, C.B.E., Sir Frederick Scopes, M.A., Dr. J. E. Hurst, C.B.E., J.P., Sir Harry Melville, F.R.S., Mr. N. P. Newman, J.P., Mr. S. H. Russell, C.G.I.A. and Miss J. Brenner. After the "Loyal Toast," Dr. Hartley proposed the toast to Dr. Pearce, giving an outline of his career with the Association and the progress that body has made under his direction. Dr. Pearce responded, voicing *inter alia* his appreciation of his wife's help and that of the Council, staff and membership of the Association. During the dinner, a presentation was made to Dr. Pearce to mark his retirement. This took the form of an inscribed silver tea-service and cheque, gifts from the founding industry of the country. Dr. Pearce also received a cast-iron portrait plaque from Booth & Brookes, Limited, and a pair of lion cubs (also in cast iron) from Buderus, Germany. The night's proceedings made a dignified and most fitting conclusion to an outstanding career. (An appreciation of Dr. Pearce's services was printed in last week's JOURNAL.)

Britain's Trade with East Improves

Main advances in British overseas trade in recent years had been with industrialized countries. Now Russia, China, and some of the eastern European countries were industrializing at a great pace, giving enormous scope for expansion of trade to those who chose to take it, said Lord Boyd-Orr when speaking at the annual meeting of the British Council for the Promotion of International Trade, of which he is president.

"It is no longer only a question of reducing impediments to trade such as embargoes and other discriminatory practices—it is now much more a matter of industry and the Government adopting a positive and aggresive policy in pursuit of trade with planned economy countries," he said in emphasizing the need for Britain to work out a trade policy which would double trade with the Russians in 1959.

Those who had minimized the adverse effects of trade embargoes had been proved wrong, said Lord Boyd-Orr, quoting trade to China as an example. Since the embargo on tractors was removed the Chinese had bought about £2,000,000 worth from British firms; £7,000,000 worth of steel orders had been received; non-ferrous metal producers had sent, or were sending, £5,000,000 worth of goods which hitherto would have been banned, and machine-tool makers had within the last few weeks received orders for over £1,000,000 worth of tools which before August were embargoed as strategic.

Founders Medals Presented at Livery Dinner

The Founders Medal (illustrated here) was designed and executed by Mr. A. Stanley Young, a past-Master of the Worshipful Company of Founders, in 1911, as an award of honour to be given by the Company, and one of these medals cast in bronze was presented last week, at the livery dinner of the Company, to each of four liverymen to mark their services in the art of founding. The awards went to Dr. J. G. Pearce, C.B.E., and Dr. J. E. Hurst, C.B.E., J.P., in appreciation of their help to the Company in the formulation of the Founders Company Fellowships and the administration since their inception. The intrinsic value to the industry of the Fellowships is due in a great part to the knowledgeable work and advice given by these two prominent members of the industry and the livery. The remaining two medals will go to Mr. C. C. Booth, J.P., and Mr. J. J. Sheehan, B.SC., A.R.C.SC.I., for their invaluable assistance in organizing the annual spring visits by members of the livery to foundries. These visits, which have meant so much towards introducing the Company to the industry, was conceived by these two liverymen whose generous hospitality and help each year have ensured their continued success.

The earliest notice of the Founders Company occurs in the letter books at Guildhall commencing in the year 1276, but it is evident that the Company must have existed at an earlier period.

Obverse and reverse of the Founders Medal, presented last week in London to four liverymen of the Worshipful Company of Founders.

On the obverse side of the medal are the arms and crest of the Worshipful Company (granted in 1634), being a laver pot between two taper candlesticks and above a furnace, and from the clouds two arms in sleeves, the hands holding a pair of closing tongs taking hold of a melting pot; underneath is the motto of the Company, "God the only Founder." On the reverse side of the medal are vividly depicted two figures in the act of pouring the molten metal from the cupola into the mould. The Sphinx can be seen in the background. The presentation was made by the Master of the Company, Mr. G. W. Ilsley, A.C.A., at the livery dinner at the Mansion House.

A Mediæval Masterpiece*

The Baptismal Font of St. Bartholomew's Church, Liege

By François Boussard

The town of Liège, where the sessions of the International Foundry Congress were held in the Autumn, boasts a masterpiece of the brass-founding craft, dating back to the beginning of the 12th century, namely, the baptismal font in St. Bartholomew's Church. The Author describes this unique work of art from both the archæological and the technical point of view. Delegates to the Congress were given the opportunity of admiring the original work in St. Bartholomew's Church, as well as a replica on exhibition in the Palais des Congrès.

A masterpiece of the founders craft was exhibited during the International Foundry Congress in 1958 in the Congress Hall, Liège, by courtesy of the heads of the town and museum authorities. This was a replica of the baptismal font from the Liège church of St. Bartholomew (Fig. 1), cast early in the twelfth century by the bronze founder, Renier de Huy. Unfortunately, during the French Revolution, the cover for the basin, which carried figures of the 12 apostles, was lost, and with it went two of the 12 oxen which support the basin, together with a frieze of "wavy" brass, representing the water of a river in which the hind feet of the oxen were plunged.

The Metal and its Casting

An intensive study of this magnificent casting permits the following observations on its method of manufacture: The baptismal font of St. Bartholomew is indubitably a casting and its creator was not a coppersmith as was once thought, but a founder. The basin was made as a one-piece casting, carrying the figures which comprise its five units. It was cast in a brass of the following composition: Copper, 77.20; zinc, 15.27; lead, 1.70; tin, 4.96; iron, 0.19 per cent. silver, traces and nickel, nil. It should be appreciated that, at that time, metallic zinc was unknown, and the element was introduced into brass by adding crushed calcined calamine to the liquid copper. (In considering the composition of the casting, it is worth noting in passing that modern science can now give remarkable help to archaeologists, for with a piece of metal thinner than a matchstick and but half-an-inch long, it is possible to carry out both spectrographic and chemical analyses.) It is clear that the font was cast in its finished position, that is, vertically with its base downwards. The body of the basin was most probably strickle-moulded in loam, using the lost-wax process for the figures and ornamentation. It is interesting to find that the founder who cast the basin did not appear to have the slightest trouble with metal contraction. There were no feeding heads and the two small risers—of which traces have been found on the top part of the basin—were no more than escapes for air.

Soundness

Slight evidence of metal shrinkage can be seen on the top face of the original casting, but it is very slight and it can be assumed that the alloy used by Renier de Huy gave very low shrinkage during solidification. In the more massive sections also, careful examination has shown the absence of "draws" or "shrinks." Current knowledge of cast brass suggests that the alloy used by Renier de Huy ought to have been relatively sound and freed from dissolved gas after melting. If such an alloy were cast to-day, in a mould freed from all traces of moisture, its fracture would be dull grey and yield a very pronounced shrinkage. If, on the other hand, this same alloy were cast in a mould still containing traces of moisture or even combined water in the clay, the metal would probably absorb an appreciable amount of hydrogen, which could be evolved at the time of solidification. Under these conditions, such an alloy would be likely to show no contraction, for the latter would be compensated for by the release of gas which is imprisoned in the alloy at the commencement of solidification. The fracture of the alloy cast under these last-mentioned conditions would be a metallic yellow, and research has, in fact, shown this to be so in the case of the baptismal font.

Brass of the composition detailed, having a metallic yellow fracture and showing only a small amount of shrinkage, is always porous and this would surely be the reason why a second bowl of lead has been beaten over the interior of the font's basin. In this operation, a layer of lead about 10-mm. thick was originally beaten over the surface of the basin, where a rough surface was provided over the whole area to key it. The composition of the lead of the bowl lining was: Tin 0.39, and antimony 0.18 per cent.; no bismuth,

* Abridged translation of an article prepared in conjunction with the International Foundry Congress in Belgium. The Author is manager of the Ciney Foundry of the Compagnie Generale des Conduites d'Eau.

zinc or cadmium; a little copper and silver, and a fair amount of iron.

Cast Oxen

The 12 cast oxen mounted below the font basin have been the subject of a number of conjectures. Some observers have described them as being of foreign origin, saying that they were older than the bowl, and that they were the spoils of a victorious emperor. This idea calls for the following comment: (*a*) The oxen carry or carried projections having exactly the same shape as recesses situated in the base of the font along its diameter; obviously the oxen and the basin thus form part of a complete assembly, and this would not be expected if the oxen existed before the making of the basin; (*b*) the metal of the oxen shows it to be an alloy of a composition much the same as that of the basin, *viz.*:—

FIG. 1.—*Baptismal font in cast brass located in St. Bartholomew's church in the city of Liège. Cast at Huy at the beginning of the 12th century, it is considerd to be a masterpiece of the mediæval foundry-work of Western Europe. (A replica of the font was housed in the Palais des Congrès during the period of the International Foundry Congress.)*

Element, per cent.	Oxen.	Basin.
Copper	77.20	77.20
Zinc	15.87	15.27
Lead	1.66	1.70
Tin	4.41	4.96
Iron	0.21	0.19

This shows that it is almost certain that the basin and oxen were made by the same founder.

Moulding the Basin

Fig. 2 shows how, in the Author's opinion, it was possible for this basin for the baptismal font to be moulded, taking into consideration the means available to the founder at the time, that is, about the year 1100. The core of the basin was probably swept up in loam on a loam bed, itself swept up and extended to form a base for the exterior. After having covered the bed with an insulating layer, a fresh layer of loam (just over ½-in. thick) would be set and after drying, again covered with an insulating layer.

On the bed so prepared, loam bricks would be used for the making of the core shape, leaving about 0.4 in. for a layer of loam; this would be strickled to give the exact shape of the interior of the basin. The core so made would next be well dried by a wood fire, in a number of stages, and finally it would be covered with a refractory coating. This core would then be used to form the exterior of the pattern for the basin, by first covering it either with wax plates 14-mm. thick or a layer of loam of from 10 to 12-mm. on which, after drying, would be applied a layer of wax 2 to 4-mm. thick. (It is obviously impossible to say if all the thickness (14-mm.) was in wax or if a considerably thinner layer of wax was used by using a basic layer of loam.)

Having thus obtained a pattern from the outside shape of the body of the basin, absolutely smooth and carrying a layer of wax on its surface, it would then be possible to set on this the upper and lower mouldings of the figures and ornamentation themselves made in wax. Undoubtedly, these would be prepared separately. The artist would then retouch the whole assembly which was to form the exterior of the basin, carrying five separate scenes from biblical history. The whole was then covered, using a soft brush, with a layer of finely ground *potée* (slurry). This was probably composed of fine sand, clay, and horse manure—exact composition of the mixture being jealously kept secret by the specialist founders. In preparation this material was dried and ground twice, wetted, re-dried and sieved. It was then conditioned by the addition of finely-powdered refractory brick, and then once again wetted, re-riddled, and finely strained through muslin. This slurry, by then quite liquid, was finished by adding white of egg to make it adhere.

When the first layer of the wash had been thoroughly dried, a second and further layers would be applied until the required thickness was attained. After this, a mixture of the wash and red sand was added until the thickness reached 6 or 7 cm. (about 2¾ in.). Then loam would be applied by hand to build up a total thickness of 25 to 30 cm. (10 to 12 in.). The whole of the mould would then be assembled, using iron bands. Finally the various layers were air-dried and the finished assembly dried by a wood fire, the wax being melted and evacuated through holes designed for this purpose, leaving a space forming the actual mould. It is clear that it was necessary to provide for opening the mould for taking out the core, in such a way as to permit first the removal of the loam thickness-pieces placed in the bottom, and later on the core itself.

Openings would have been made for the introduction of the liquid metal into the mould at the bottom of the basin, and at the top of the basin there were two holes for venting. It would also appear that at this period in founding history the whole mould would be prepared in a pit to permit of the runner basins being at ground level.

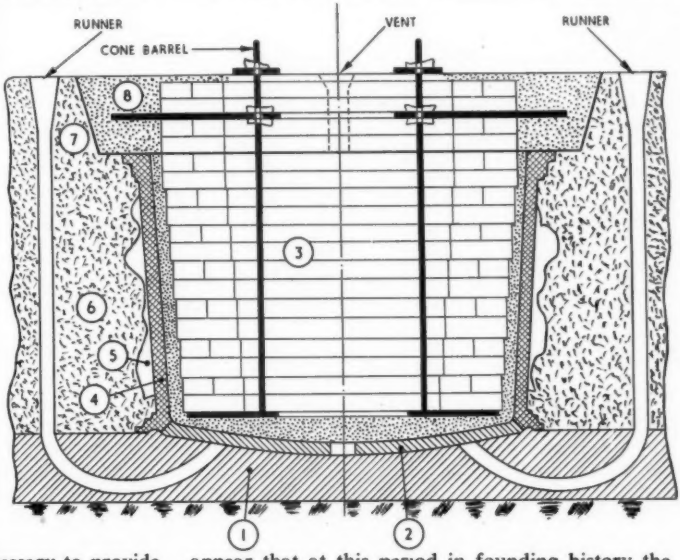

FIG. 2.—*Diagram showing the probable method of moulding the baptismal font.* (1) *Loam bed;* (2) *layer of loam (about ½ in.);* (3) *central core made in loam bricks;* (4) *¼-in. layer of wax, or loam and wax;* (5) *figures modelled in wax;* (6) *outside mould:* (7) *mould extension and print, and* (8) *core extension and print.*

Rolls-Royce Engines for Canada

After a considerable period of negotiation, the International Harvester Company of Canada, Limited, and Rolls-Royce of Canada, Limited, have reached agreement that all the heavy-duty diesel trucks manufactured at International Harvester's Hamilton plant will be powered by Rolls-Royce engines.

Diesel engines and parts manufactured at the Rolls-Royce oil engine division works at Shrewsbury will be shipped to Hamilton for assembly into a new line of heavy-duty trucks. Seven models of International Harvester heavy-duty diesel trucks will be made at Hamilton. These will be used for transport, road construction, cement-mixing, quarrying, and other purposes. Production is expected to begin in the New Year.

Decline in Italy's Steel Output

Italian steel output in the first 10 months of this year amounted to 5,256,000 tons. Compared with the total for the corresponding period of last year—5,649,000 tons—this represents a decline of 6.94 per cent. Pig-iron output was 1,730,000 tons, compared with last year's figure of 1,746,000 tons—a decline of less than 1 per cent.

Crude steel output during the month of October fell by 10.85 per cent. compared with October, 1957. A total of 559,000 tons compares with 627,000 tons. October pig-iron output was 170,000 tons, 4,000 tons more than in the corresponding month last year.

Upturn in German Steel is Forecast

Estimates of 1958 iron and steel production in western Germany put ingot steel output at barely 23,000,000 *tonnes* and pig-iron at no more than 16,000,000 *tonnes*. These figures will not be reached if December production falls below that of December, 1957. Last year total production was 18,400,000 *tonnes* of pig-iron and 24,500,000 *tonnes* of steel.

Dr. Fritz Harders, director of the Dortmund-Hörder Hüttenunion, said in Dortmund that in his opinion the recession was temporary only. Future steel production in Europe was assured, he said, and there need be no fears that the "capacity boundary" had been crossed. In the near future there would be a general livening-up, with steel production rising by 2-3½ per cent.

Dearer Basic Materials

A rise of 1.1 per cent. was recorded by the Board of Trade's index of basic materials prices last month. This was mainly due to an increase of 2.8 per cent. in the price of copper. An 0.5 per cent. increase in the price indices of materials and fuels in the mechanical engineering, electrical, and machinery industries is attributed to the higher prices of non-ferrous metals, particularly copper.

Manufactured goods, on the whole, remained unchanged in price. There were, however, a few small increases in the prices of chemical and metal products and also one or two reductions.

ISI Translations

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

1086 HARJES, W.: Resistance to Thermal Shock of Various Basic Refractories. *Radex Rundschau*, 1957, (2), pp. 501-507. (£3 10s.)

1091 ANON.: Complex Automatic Control in the Iron and Steel Industry. *Stal*, 1958, June, pp. 481-485. (£5.)

1101 BESHLYK, A. S.: Experience in the Casting of Rolling-mill Rolls in Cast Iron Modified with Magnesium. Production of High-strength Cast Iron, ed. L. I. Fantalov, Moscow, *Akad. Nauk* S.S.S.R., 1955, pp. 173-181. (£5.)

1102 KLETSKIN, G. I., and L. YA. OZERINA: Experience in the Development and Adoption of a Production Technique for Cast-iron Modified with Magnesium. Production of High-strength Cast Iron, ed. L. I. Fantalov, Moscow, *Akad. Nauk* S.S.S.R., 1955, pp. 182-191. (£5 5s.)

1128 SCHOFFMAN, E., and H. MALISSA: Determination of Small Titanium Contents in Iron Alloys and Ores after Separation of the Heavy Metals with Pyrrolidine Dithiocarbamate. *Arch. Eisenhüttenwesen*, 1957, Oct., pp. 623-624. (£2 15s.)

Translations in course of preparation include:

1146 JONCKERS, M. D. E., and A. DANIELS: Spectrometric Analysis of Basic Bessemer Pig-iron and Steel by the Scanning Slit Method. *Rev. Mét.*, 1958, July, pp. 601-612.

1147 ONO, K., and R. SASAKI: Effect of Non-metallic Inclusions and Mo on the Mechanical Strength of 13 per cent. Cr Steel. *Tetsu-to-Hagané*, 1955, Dec., pp. 1258-1264. (Abstracted in the JISI, 1956, Oct., p. 242.

1148 HACHE, A.: Stress-corrosion Tests on Mild Steel. *Rev. Mét.*, 1958, July, pp. 656-676.

1149 POGGIO, J. A. G.: Use of Steels at High Levels of Tensile Strength. *Tecnica Metallurgica*, 1957, (109), pp. 1-43

If any reader knows that translations of any of the papers in the last list have already been translated, it would be appreciated if he would inform the Editor of this JOURNAL.

British Standards Institution

The November *Newssheet* of the British Standards Institution, lists amongst new British Standards, B.S.2995:1958 Cast and forged steel valves, screwed and socket-welding (sizes ¼- to 2-in.), for the petroleum industry. Amended standards include B.S.240 Part 1:1937 Method and tables for Brinell hardness testing. Amendment No. 1 PD 3200; B.S.410:1943 Test sieves. Amendment No. 6 PD 3192; B.S.427:1931 Diamond pyramid hardness numbers. Amendment No. 1 PD 3197; B.S. 891:1940 Direct reading hardness testing (Rockwell principle). Amendment No. 1 PD 3198. Two reprints of interest to founders are S 98:1949 75 ton, 2¼ per cent. nickel-chromium-molybdenum steel (high carbon), and S 110:1949 Chromium-nickel steel (corrosion resisting), the cost of each being 2s. 6d. Draft Standards on which the Institution would welcome comment include CZ 629 Constructional and performance requirements for inset open fires with boiler and without convection; CZ 631 Thermal and other requirements for coke-burning inset open fires without boiler and without convection. (Not covered by Part 1 of B.S.2845); CZ 655 Mechanical testing of steel at elevated temperatures. Part 2 Stress rupture. Part 3 Non-interrupted creep testing. Part 4 Interrupted creep testing; CZ 881 Flanged cast-iron gate valves (Classes 125 and 250) for the petroleum industry (revision of B.S. 1735); and CZ 1244 Flame-proof industrial clothing (materials and design) (revision of B.S.1547:1949).

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

800,981. Babcock and Wilcox Company, 161, East 42nd Street, New York, 17, New York, USA.

A continuous casting mould which is effective in overcoming mould distortion in the casting of polygonal shapes.

801,042. General Motors Corporation, Grand Boulevard, Detroit, Michigan.

A method of making composite valve tappets for internal combustion engines. By means of this invention, the main body of the tappet may be made of a relatively inexpensive metal; the foot portion being of cast metal having high-wear resistance, and metallurgically bonded to the main part. Thus, costs of making and machining the tappet are reduced.

801,143. Electric Steel Foundry Company, 2141 N.W. 25th Avenue, Portland, Oregon, USA.

A centrifugal metal-mould casting process which is useful in the production of centrifugal castings by both horizontal and vertical rotation. After molten metal is poured into a rotating mould to form a hollow casting, a carbon-bearing gas, such as a hydrocarbon gas, is introduced into the interior of the casting before solidification. The interior of the casting is then heated while in the fluid state: the outside being simultaneously cooled to bring about progressive unidirectional solidification of the casting from the outside inwardly to its internal face.

801,187. Bristol Aero Engines, Limited, Stonebridge House, Colston Avenue, Bristol, 1.

Production of shell moulds. This invention is an improvement on that given in B.P. 759,018 (FOUNDRY TRADE JOURNAL, November 29, 1956).

801,258. Chicago Pneumatic Tool Company, 6, East 44 Street, New York, 17, N.Y., USA.

Corebox vibrators for use in loosing the corebox from the mould. The invention provides for a vibrator which has an integral pneumatically-operated clamping-unit which can be operated prior to, and during, vibrating action. A clamp is also provided which can be kept in position on a corebox for removal of the latter from a mould, after the corebox has been freed.

Sheffield University to Specialize further in Science and Technology

Priority is to be given for science and technology provision in the building activity which is to go on during the next few years, states the annual report of the Council and Senate of Sheffield University.

There is nearly £3,000,000 already promised for buildings under construction or soon to be started, and in addition, the University Grants Committee have allocated £3,750,000 for new buildings to be erected in the period 1960-63. During the next ten years the Government expects the total numbers of university students to increase from 88,701 in 1956, to 124,000, and of the 4,600 to be provided for in Sheffield by 1966, it is hoped about 1,550 will study pure science, and 1,250 technology, with a relatively smaller increase in other subjects.

Notes on the History of Patternmaking

By L. Faulkner

In the JOURNAL of some twelve weeks ago, there was given a short account of the casting of twelve bronze oxen which support the stainless-steel font of the new Mormon Temple recently completed in Surrey. In the Bible, one reads an account of the casting of bronze pillars, basin, and twelve oxen for Solomon's Temple. Both undertakings were achieved by the use of wax models and between these two very similar events in the long history of founding there lies the whole interesting story of the development of patternmaking.

Founding in Antiquity

Long before the building of Solomon's Temple, the craft of foundrywork was at an extremely high level. Excavations at the Royal Cemetery of Ur show that before 2500 BC a vast knowledge of most foundry processes was already available. In the Bronze Age, implements were cast in open moulds of baked clay or of stone. From this was developed the use of a closed mould. Later, craftsmen found solid castings were too extravagant in metal and time. Hence, they evolved methods for hollow castings with the attendant necessity for cores, chaplets and vents and, of course, the need for a pattern. This last requirement was supplied by the use of wax and two distinct wax processes were in use—the *cire perdue* in which the wax had to be melted away from the mould, and the piece-mould, as illustrated in Fig. 1, in which the wax mould could be lifted out whole when a side piece was taken away.

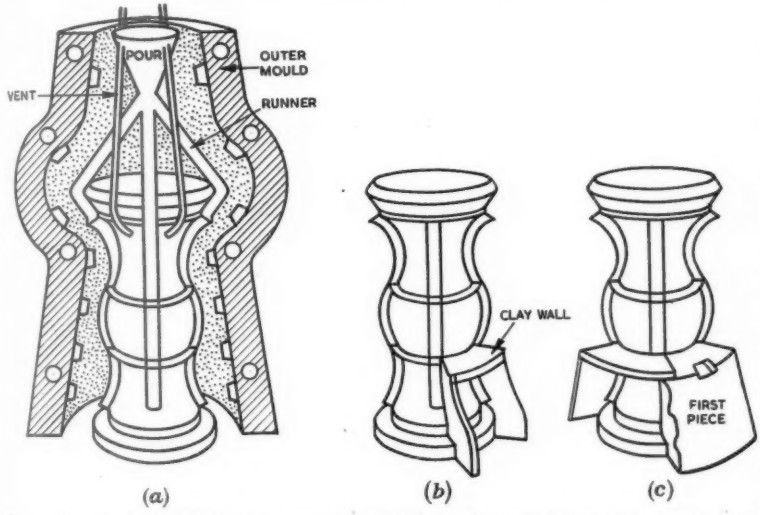

FIG. 1.—*Piece-moulding a Chinese tsun (wine vessel), (a) a general view of the mould; (b) wax model with walls for the first part of the piece-mould in position, and (c) first part of the piece-mould completed with mortises cut; boundaries of the second part are in position.*

Renaissance

The method of moulding from expendable wax patterns, mainly used for non-ferrous work, lasted for many centuries as normal practice, and even when gunsmiths were making the body of their castings by loam moulding, they would use the *cire perdue* process for ornamental parts. As late as 1517, one reads that when King Henry VIII had a bronze gun cast for him at Fontarabia in Spain, by one Jacobo de Lerucci de Palma, "wax was bought to make the King's Arms and other conceits in the mould."

Then came the 16th century and the advent of the great Renaissance period when progress and expansion in all directions was very rapid. In Italy, wax moulding had already given way to loam moulding and an unusually advanced type of pattern for non-ferrous work was described by Biringuccio, head of the Papal foundry in Rome, in which patterns were being made of tin and brass.

In England, the Sussex ironfounding industry was in full swing, with a reputation for loam moulding of guns which is a classic in the annals of founding. Bellfounding, too—so important a craft in that monastic age—was loam moulding *par excellence*. This method of moulding demanded but the simplest forms of patternmaking and the process was frequently spoken of as "strickling." As in the

case of gun-making, it was most generally used in conjunction with wax moulding. It is interesting to note in this connection that a wash composed of very-finely-ground refractory material incorporated white of egg to enable it to adhere without damaging the wax pattern. After painting on a number of layers, thicknesses were gradually built up until the whole mould could be encased in iron bands.

Foundry Industry Established

The rapid expansion of populations and prosperity attendant on the Renaissance created a general need for iron castings for domestic use as opposed to the more ornamental non-ferrous work. The 17th century, therefore, saw the establishment of a regular foundry industry working more in iron. In 1628, Robert Norton, one of His Majesty's gunners, suggests in his writings the use of a more permanent type of pattern and says that for the founding of ordnance " a modell or perfect patterne is made of timber, or of earth, or both." In 1703, the accounts of one Fuller, ironmaster of Heathfield, show that he paid a carpenter for " making pattern and mending and putting in of gudgeon."

The cast-iron fireback, which had been a very prosperous source of industry in Sussex for so long, gradually gave way to the stove. Until then the stove had been a luxury for castle and monastery, but as it became a necessity for the individual, there was created the need for a pattern that would last.

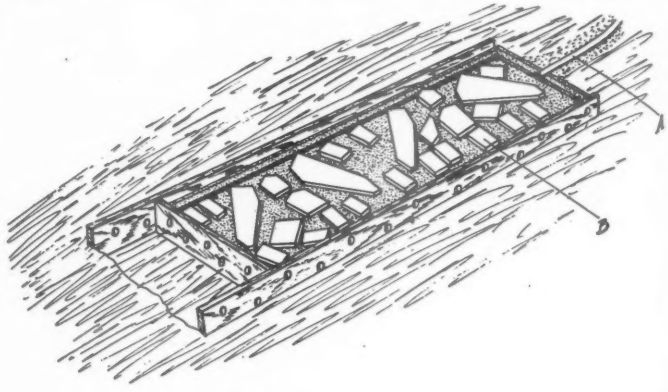

FIG. 2.—*Mould with woodcut dies in place.*

(Courtesy " Development of the Metal Castings Industry," by Bruce L. Simpson.)

Advent of Wooden Patterns

The modern wooden patterns had their beginnings in the production of the fireback in open sand. From decorating the plain surface by the impress of ropes, dating and initialling by the use of wooden pattern dies (Fig. 2), it was a natural step to the use of more elaborate wood-cuts pressed into the sand one at a time. Later, individual wood-cuts would be fastened on to a board and eventually the entire pattern came to be made in wood. Germany led the way in this field. Patterns of great beauty were fashioned by the sculptor, Stilarsky, for the famous Berlin cast-iron productions at the beginning of the 19th century, and examples of his work are preserved in the Lamprecht Collection in America, owned by the American Cast Iron Pipe Company. Another collection of beautiful ornamental wooden patterns of the Baroque period was found in the attic of an old mining school at Saarbrücken and is still in existence.

The Machinery Age

An important step in the progress of the patternmaking trade was reached when Abraham Darby in the early 18th century perfected the art of holding together moulds stamped in sand by means of boxes called flasks. This considerably increased and cheapened the production of domestic utensils, but the decisive factor in the establishment of the trade was the birth and growth of engineering.

Steam-run machines demanded complex components and a new situation arose, which is so graphically described by Josiah Rose in his article on " The Patternmaker's Assistant," published in serial form in *Scientific American* in 1876, that a quotation in full is of interest. . . . " But the modern idea of the division of labour has exalted it (patternmaking) to be a distinctive art. In the last generation, for instance, a good machinist (or rather engineer or millwright, for those terms were then applied to builders of machinery) was required to be alike expert in working upon both wood and metal. He constructed his framing of wood and made the patterns for his cast metalwork. He was to-day a lathe hand, to-morrow a vise hand. As, however, the present age of iron dawned, it became apparent that working in wood and in metal must be separated, not only because the handiwork would be more cheaply produced by reason of the increased skill arising from continuous practice, but also because the amount of knowledge required to make an artisan skilful in either manufacture of wood or of iron was too great to be thoroughly mastered in the working lifetime of an ordinary, or even unusually expert, workman. Hence, modern intelligence soon discovered that better as well as cheaper work could be obtained by a practical education in one particular branch of usefulness and hence patternmaking has taken its place as a speciality. The field of usefulness of cast iron has developed to a remarkable extent during the last 20 years and the same remark applies to cast steel during the last 10 years. Both of these materials are steadily encroaching upon the domain of usefulness of wrought iron, stone, and bricks and mortar, so that the field of patternmaking is

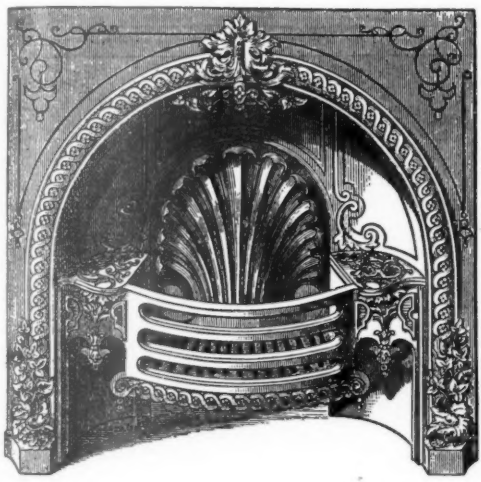

FIG. 3.—*Coalbrookdale Company's cast-iron fireback of the type having highly-ornamental design and recessed hobs.*

stretching outward and onward to the discomfiture of its rivals."

Rapid Development

Foundries began to spring up everywhere and patternmaking almost overnight had to become a highly accurate and precise affair. Unfortunately, the new machines themselves were so spectacular in conception that history only records the invention of the steam-engine, the spinning-jenny, the locomotive, etc. It is hard enough to amass details of the history of those foundries which made the required components and harder even still to glean information of the patternshops at the back of those foundries.

One gathers that not least amongst the pre-occupations of these early machine-age patternmakers was the production of tooth forms for gears; many of the men evolved their own formulas for this work which they kept strictly to themselves.

The new problems of creating engineering patterns gave craftsmen great opportunity to gain experience and skill, and by the time the Victorian Age had arrived a number of patternmakers had set up in business on their own as distinct from being an integral part of the foundry. The United Pattern Makers, a craft union, was established in 1872, and the term "engineers' patternmaker" came into general usage about the end of the century.

New Iron Age

During Queen Victoria's reign and more especially immediately following the Great Exhibition, there was a tremendous vogue for highly-decorative cast-iron work. Whole buildings, such as the Crystal Palace, the Palm House at Kew, and the Coal Exchange in the City of London, used cast iron in their basic construction, whilst nearly all buildings erected at that time incorporated vast amounts of ironwork in their design. Intricate gates, railings and furniture were made in much-scrolled iron castings and domestic ranges were elaborate in the extreme. Fig. 3 shows the level of decorative art which domestic ironwork reached at that time.

Then, once again, the sculptor/patternmaker made his appearance, and highly-paid artists were employed by firms to produce these beautiful designs. Coalbrookdale, for instance, had chimney-pieces (Fig. 3) designed and modelled for them by Alfred Stevens, sculptor of the Wellington Monument in St. Paul's Cathedral. This firm lists with pride its panel of designers, amongst whose names are many French artists. Mr. A. Stanley Young, son of Mr. Henry Young, a notable London founder, of H. Young & Company, is now the doyen of the Worshipful Company of Founders, and was the sculptor of some well-known memorial plaques, including the Worshipful Company's medallion. Incidentally, it is of interest to note that the only living past-master of the Founders to have been a Liveryman, by virtue of actual servitude in a foundry, is Mr. J. L. Wheeler, who was a patternmaker's apprentice under Mr. Henry Young.

Many Patternmaking Firms Established

There is a long list of patternmaking firms setting up in business for themselves towards the close of the 19th century. David Brown's of Huddersfield were patternmakers specializing in gear work, in 1860. Mr. Perry, of Leicester, whose firm was established in 1889, still has in his possession an old works diary of 1903 in which his firm is described as "Patternmaker and Millwright to Engineers, Machinists and Ironfounders." In the Birmingham area, one of the oldest separate patternmaking firms is beyond doubt that of William King (Birmingham), Limited, established in 1885. Fellows & Darby, Limited, followed in 1895 and these two firms have only recently amalgamated. Mr. King himself, who died in 1952 at the age of 90, served his apprenticeship from 1876 to 1882 under Mr. John Barron, a master patternmaker of Smethwick. Now in 1958, apart from the vast number of "tied" patternshops, there is a large number of separate patternmaking firms in the country, employing about 16,000 craftsmen. The National Society of Master Patternmakers was formed in 1954 and has a membership approaching 100.

Developments in Methods

There is no method in patternmaking which has become outmoded throughout its long history; the oldest and the newest each has its proper sphere of usefulness. The *cire perdue*, age-old process that it is, is still extensively used in art-foundry work, for medical instruments and for numerous precision-engineering parts. Loam moulding, common practice in the Middle Ages, is still widely used in bell-making and for large castings. Wooden patterns, first made by carpenters in the Middle Ages for the ordnance industry, were next the concern of engineers and millwrights; finally about 100 years

Notes on the History of Patternmaking

ago, they became the basis of modern practice in a separate patternmaking trade.

Metal patterns, making their appearance at the beginning of the industrial era, developed into a high-precision branch of the trade alongside the growth of the car and sewing-machine industries. They now account for about half of the total production of patterns made by the larger independent shops. Plaster patterns, developed during the second world war, partly as a result of timber shortages, are used extensively for light-iron builders' castings and for one-off demands, whilst the newest developments of all are the use of pressure-cast aluminium patternplates and the adoption of epoxy resins for patterns.

Acknowledgments

The author is much indebted for their help in preparing this article to Mr. G. W. Perry, Mr. Ball of Coalbrookdale, Mr. B. E. Darby, the secretary of the National Society of Master Patternmakers, the librarians of the Iron & Steel Institute and the Patent Office.

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Unemployment Higher, but Rate of Increase Slackens

Registered unemployed numbered 536,000 on November 17, according to the Ministry of Labour's latest figures. Between October 13 and November 17 unemployment rose by 22,000, the figure of wholly unemployed rising by 32,000 and that of the temporarily stopped falling by 10,000.

The rate of increase in unemployment slackened a little in November, but the percentage was higher than in October, mainly because of seasonal changes. The percentage of unemployed in November was 2.4, compared with 2.3 in October and 1.5 in November, 1957.

Hayward Tyler's Order for Power Station Equipment

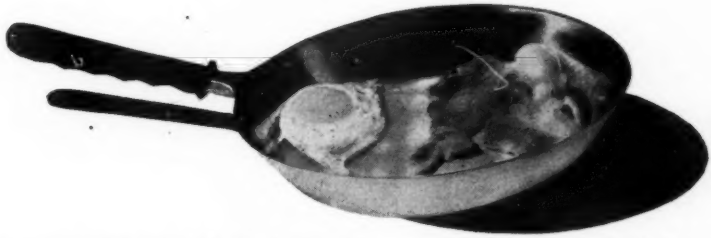
Glandless motor pumps manufactured by Hayward Tyler & Company, Limited, Luton (Beds), a member of the Stone-Platt group, are to be installed in two new power stations to be built for the Central Electricity Generating Board at Thorpe Marsh and Blyth. The pumps will operate at system pressures approaching 3,000 p.s.i.g. and will be used for the forced circulation of the boiler water through the water-tube system. Orders for 42 of these high-pressure glandless motor pumps to the value of £360,000 have been placed with Hayward Tyler within three years.

Heat-treatment Plant in Edgar Allen's Foundry

This new heat-treatment shop in the steel foundry of Edgar Allen & Company, Limited, was inspected recently by members of the Lancashire and Yorkshire technical discussion group of the British Steel Founders' Association. The new plant will treat austenitic (12-14 per cent.) manganese-steel and other alloy-steel castings, and operators employed in the shops find conditions "much cleaner and the furnaces a lot easier to work" it was reported. The steel foundry has also recently been re-equipped with jolf/squeeze/turnover moulding machines, new sand mixers, shot-blast chambers, and a new 250-ton setting press.

"Castings Sales Creation" & "Diversity of Production"—

Twin Objectives at Ainsbury Foundries, Limited, of Oldham



Not everyone can do it, of course, but how much better it would be if founders generally could secure new casting business for themselves and the industry, instead of indulging in cut-price competition for shares in existing markets in times of trade slackness. The following account is of a foundry where this precept is followed as a definite policy, and credit is due to its executives for enterprise and initiative.

"Don't put all your eggs in one basket" is the motto of the men who produced this cast-aluminium frypan of unusual tilting design. It has "eye-appeal" as well as technical merit.

Few foundries, even of a much larger size, can have such a diversity of interest as Ainsbury Foundries, Limited, of Hollinwood, near Oldham. Over 100 customers in practically every trade are supplied with iron and non-ferrous castings, and aluminium sand and gravity-die castings.

Commencing as a jobbing brass foundry, an adjoining iron foundry was later acquired and developed, and both were served by a small but efficient patternshop. Whilst Ainsbury are still essentially jobbing foundries, hand moulding machines are also used, giving efficient and economic production of medium-quantity runs of castings. Since then there has followed the building of an aluminium gravity-die-casting foundry which has grown steadily, mainly as a result of developing sales of the firm's own products. These have been marketed through an associate company under the trade name of "Gateware."

Typical Lines

Commencing by making cast domestic holloware, the company claim to be the largest manufacturers of cast-aluminium cooking utensils for the catering trade in this country. Their utensils have travelled far and wide—in the galleys of cargo boats and tankers, and are in use in hotels and canteens throughout the world.

It is of interest here to mention that a 24-in. dia. pot, 18 in. deep, has been produced at the works as a gravity-die-casting—a quite large one, as readers will agree! This experience of casting for the food trade has made quality control of paramount importance and this is reflected in the standard of work produced.

Many original ideas to help housewives have been applied as a basis for the design of castings produced, as for example, a range of spiked meat dishes that hold joints steadily whilst carving (Fig. 1). The tilting frypan illustrated at the head of this article is another example of useful design to aid the housewife and "create" casting sales. This creation of casting sales has always been a strong point of this company and pride is taken in the fact that hardly any of the turnover in this particular section has been at the expense of any other foundry, a very significant point to bear in mind in increasing the coverage and overall turnover of the industry.

Some years ago, many types of television-aerial brackets were designed and very large quantities

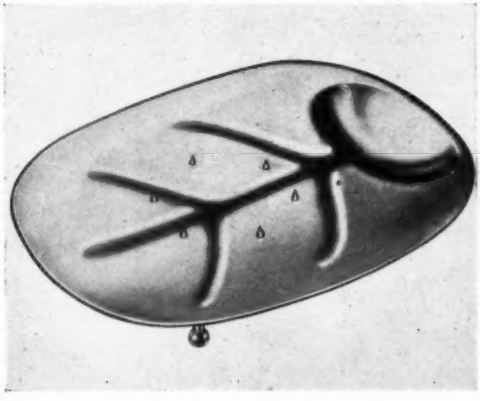


FIG. 1.—*Novelty of design and consideration for the housewife is reflected in this cast-aluminium meat dish, which incorporates spikes to prevent the joint from sliding while it is being carved.*

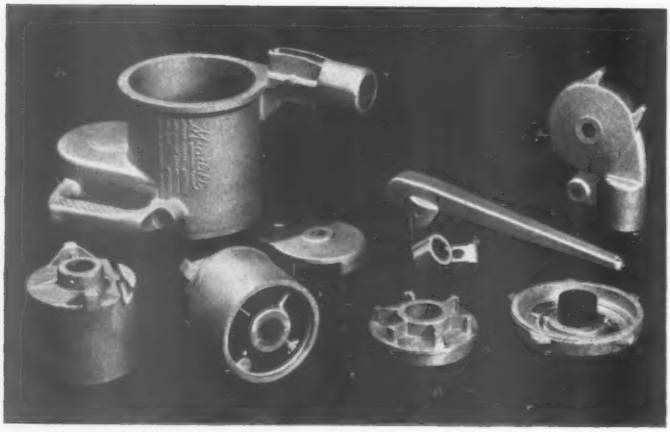


FIG. 2.—*Component parts for an electric hoist, made as die-castings. Cast-in inserts, and close dimensional tolerances maintained, have reduced machining on these components to the minimum possible.*

Reproduced by courtesy of Didsbury Engineering Company, Limited, Manchester.

sold. This business has somewhat declined, but now a range of dies to produce castings for road-traffic signs has been laid down and these are providing a useful service to the traffic-sign trade.

Sand Foundry

In the aluminium sand foundry, a range of decorative wall-lights has recently been introduced, which are believed to be completely unique. Master patterns were supplied to G. Perry & Sons, Limited, Leicester, who made from them the pressure plates illustrated in the JOURNAL some weeks ago.* Other finished products of this section are moulds for the rubber industry.

This foundry makes the largest aluminium sand castings produced in any jobbing foundry in the Manchester district, making individual units up to 15 cwts. Melting is by four 600-lb. capacity oil-fired tilting furnaces, giving very substantial capacity. For use by the die-casters, the metal is transferred to oil-fired bale-out furnaces, but is, of course, used direct by the sand-casting section. All cutting-off is by bandsaw and most of the finishings by disc sander or backstand machines. Considerable use is also made of portable disc-sanders on flexible-shaft machines.

Nearby property has been acquired recently and a continuing policy of expansion is envisaged. Whilst it is anticipated that this will now mainly be in the direction of more general commercial work, further original ideas are at the prototype stage for future marketing.

* See "Extension to Perry's Pressure-cast Foundry," JOURNAL, October 16, 1958. p. 471.

Northern Aluminium to raise £5,250,000

Plans to raise £5,250,000 have been finalized by the Northern Aluminium Company, Limited, the British subsidiary of one of the world's largest aluminium producers—Aluminium, Limited, of Canada. The parent company is providing half of this money by taking up 3,000,000 ordinary £1 shares at par. Another £2,250,000 is to be raised in London by a private placing of debenture stock with Morgan, Grenfell & Company, Limited. Holders of the £750,000 3½ per cent. sterling debentures, due for repayment between 1959 and 1961, have also agreed to exchange their holding for an equal nominal amount of the new debentures, together with an appropriate cash payment. No quotation is being sought for either the stock or the shares.

The additional funds will be used for general company purposes. These include the financing of £8,600,000 of capital expenditure during 1958-61, mainly on the installation of additional fabricating capacity at the company's Rogerstone works, near Newport (Mon). Northern Aluminium contributes about one third of the national fabricating output and the extension of its Rogerstone rolling mills will raise their annual capacity.

ALLOCATION of another telephone number to its Worcester branch office is announced by British Insulated Callender's Cables, Limited. The new number is Worcester 6074. It is in addition to the present one, Worcester 2070.

"Bigger and Better" Policy of UK Oil Industry

"Large Scale Organization and Change: A Study in Oil Marketing," was the title of a paper read to the Royal Society of Arts recently by Mr. Christopher Brunner, director of marketing for Shell-Mex & B.P., Limited. Six major companies and their affiliates hold the lion's share of the British market in oil products and the largest, Shell-Mex & B.P., holds half the total market, he said.

Emphasizing the competitive character of the UK market, Mr. Brunner said there was no agreement "either explicit or implicit" for the marketing companies to divide either the whole or part of the market among themselves in any agreed proportions. The pattern of the market had been modified in several respects over the past eight or nine years. "Bigger and better has been at the root of planning for depots, tanks, and vehicles, and the principle of never doing yourself something which others can do better and cheaper, has been reflected in our policy of contracting out."

Annual turnover of the oil industry, excluding motor fuel duty collected for the Government is of the order of £540,000,000.

The Scientific Film Association announces the appointment of Mr. EDMUND J. COOPER, as general secretary.

Brussels Awards to UK Exhibitors

On the Wednesday of last week, the JOURNAL'S representative attended a ceremony in the Grand Council Chamber of the Federation of British Industries, in London, at which His Excellency René van Meerbeke, the Belgian Ambassador, presented 159 awards won by exhibitors in the British pavilions at the Brussels International Exhibition. That these awards, made by international juries at the time of the exhibition, were obviously very highly regarded, was demonstrated by the attendance at the ceremony in London, in nearly every case, of the chairman or managing director of the prize-winning group, or firm, to receive them.

British Steel Casting wins Diploma of Honour

The foundry industry was well represented in the prize-list, one major award being that of a diploma of honour for a one-piece cast-steel bogie (illustrated below), made by English Steel Castings Corporation, Limited, of Sheffield, and loaned to the British Iron and Steel Federation for display on their stand. Mr. C. Muirhead, a director of the English Steel Casting Corporation, received the diploma from the Ambassador. The bogie is of the type supplied to the English Electric Company, Limited, for a batch of 750-h.p. diesel-electric locomotives to the order of New Zealand Government Railways.

Sir Norman Kipping, director-general of the Federation of British Industries, acted as master of ceremonies; also present was Sir John Balfour, G.C.M.G. (United Kingdom Commissioner-General to the Exhibition). In his address, Sir John said that the Exhibition would have been incomplete without industry's representation, which was of a very high standard, and that the general excellence of the British products displayed had most certainly enhanced Britain's reputation abroad.

After the awards had been distributed, two films of the Exhibition were shown. The first, a seven-minute professionally taken colour film, described Whitbread's "Britannia Inn," which had been a rendezvous for Britons at the Exhibition. The second film, of 40 minutes duration, had been taken privately by Mr. J. D. D. Shaw, M.B.E., managing director of James Kilpatrick & Son, Limited, and was a comprehensive survey, in colour, of the whole Exhibition.

Smaller Firms Must Help in Training Schemes

Emphasizing the necessity for smaller engineering firms to provide more training courses for apprentices through participation in group schemes, Sir Willis Jackson, director of research and education of Metropolitan-Vickers Electrical Company, Limited, said that firms which had so far been content to fill vacancies from the trained products of the larger firms should begin to make a proportionate contribution to the national pool of comprehensively trained people.

Beyond question, the larger firms, which already had extensive training schemes, could not double the number of training places within the next 10 years unless they themselves doubled in size. His company employed 22,000 persons in a single factory at Trafford Park, Manchester, and of these about 2,800 were apprentices. They were subdivided as follow:—Graduate apprentices (including 145 from overseas), 310; probationary college apprentices (between school and university), 150; student apprentices, 320; craft apprentices, 1,400; technician apprentices, 350; special trainees (of graduate type), 150; non-graduate trainees, school apprentices, and junior clerks, 115.

The number of boys and girls getting GCE at advanced level in physics and mathematics was now about 14,000 a year and was rising more than 1,000 a year. The annual output of graduate and equivalent technologists will have doubled by the late 1960s. What was not so certain was whether the effective training places in industry would keep pace with this increase; if not, a good deal of frustration and loss would occur.

Sir Willis was speaking at the Manchester University School of Education last week.

Six-wheel "Commonwealth"-type steel bogie, cast by English Steel Castings Corporation, Limited, of the type which was awarded a diploma of honour in the steel and iron foundrywork class at the Brussels International Exhibition.

Equipment & Supplies

Conveyor-belt Width

Sandvick Steel Band Conveyor Company, Limited, Selly Oak, Birmingham, has prepared a nomograph which provides an easy way to determine the proper conveyor-belt width for handling bulk materials. To use the nomograph, it is necessary only to know the tonnage of material to be moved per hr., its density (lb./per cu. ft.), conveyor speed (ft. per min.), and a "material factor," "A," "B," or "C," which depends on the characteristics of the material being handled., *i.e.*, whether it has sharp or rounded edges, *e.g.*, limestone and coke, or is powdered moist, or plastic material such as foundry sand.

Although the nomograph has been developed for use in specifying steel-belt conveyors, it may also be used for other types of flat-belt conveyors. (Somewhat unfortunately in the writer's opinion the nomograph is calibrated in short tons (2,000 lb.) whereas use of the long ton (2,240 lb.) would have better suited British users and not have caused great error for metric-ton (2,200 lb.) users.)

Shower Cubicle

Reinforced Plastic Developments, Vincent Lane, Dorking, have introduced the "Dolphin" shower cubicle (Fig. 1). It is made from glass-fibre reinforcement material and Polyester resins. It is available in various colours; curtains, sprays, soap dishes, and other extras being obtainable if required. The cubicle is delivered in sections with full assembly instructions. (The firm has an installation service available for the Greater London area.)

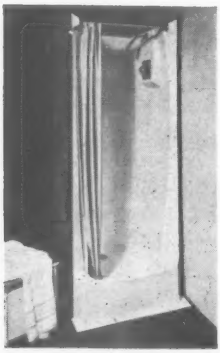


FIG. 1. — *"Dolphin" shower cubicle, introduced by Reinforced Plastic Developments, of Dorking.*

Industrial Magnifier

The safety equipment division of J. & R. Fleming, Limited, 146, Clerkenwell Road, London, E.C.1, has developed the Widefield industrial magnifier. It is mounted on a heavy base and is such that materials held for inspection at the rear of a large lens can be illuminated to facilitate inspection. The lens itself is a composite oil-filled plastic assembly, having a wide aperture and dimensions of 6¼ by 4½-in. The magnification is x 1.8 and the size permits both eyes of the viewer to be used. This magnifier is an instrument that should find many applications in the foundry industry.

Wall Chart

The Shannon, Limited, New Malden, Surrey, announce a new type of wall chart, claimed to be simple and versatile in operation and to use no pegs or string. The chart is basically an aluminium board with horizontal, serrated, channels. "Charting" is carried out with simple strips of coloured card with a serrated edge, which is merely dropped into a channel, where the serrations lock it in place. All movements are executed with the fingers.

The chart can be used for production and progress records (including stocks, budgets, finances, contracts, labour needs, plant allocation). Printed or plain charting strips provide measurement-against-time (or quantities) as well as identification of "operations," "jobs," etc. Along the top can be dates, percentages, etc., against pre-decided programmes and thin black lines can provide a moving cursor against these programmes.

Hacksaw and Clamping Device

Trend Industrial Equipment, Limited, London, N.W.10, have developed special clamping devices for the FEIN portable hacksaw. These clamps enable the hacksaw to be securely fastened to unusual shapes.

The FEIN hacksaw incorporates a high-speed steel sawblade which reciprocates at 480 strokes per min., each stroke being 2½ in. in depth. The weight of the machine is 17½ lb. and in normal application a 4 in. dia. pipe with ¼ in. wall-thickness can be cut through cleanly in three minutes. Adjustment of the clamps enables the machine to perform mitre cuttings also. It can be single phase a.c./d.c. electric or pneumatically driven and could well be adapted for cutting off awkwardly placed runners and feeders from large castings.

Potentiometers

Electroflo Meters Company, Limited, Abbey Road, Park Royal, London, N.W.10, have introduced a new type of electronic potentiometer, designed to register low potential electrical values from signal sources such as thermocouples, resistance thermometers, flow meters, strain gauges, and shaft position indicators, etc. It is available as a single-point recorder; a recorder with multiple alarm switching; a control-recorder with two-step or proportional action and as a recorder-converter with pneumatic transmission signal of 3 to 15 lbs. per sq. in. Further details are given in Publication No. 197, obtainable from the above address.

Stock Identification. Precision Components (Barnet), Limited, 13, Byng Road, Barnet, Herts, in a leaflet disclose a system of marking stock-bins, and the like, by providing easily assembled interlocking letters and numbers, and then sticking them on to the actual bin with special adhesive tape—which the firm also supplies.

DESOUTTER BROTHERS, LIMITED, of The Hyde, Hendon, London, N.W.9, announce that their portable electric power tools will now be offered for sale direct to the retail market. The first four main distributors to be appointed, are Buck and Hickman (London and all branches), A. J. Howard (Southend), G. A. Robinson (Stoke-on-Trent and Coventry) and Power Tools, Limited (Birmingham and London).

GREAT LAKES CARBON INTERNATIONAL LIMITED, with sales offices at 140 Park Lane, London, W.1, has been appointed sales representative for all commercial products of the new Anglo Great Lakes Corporation, Limited, graphite plant at Newcastle-upon-Tyne, England. In addition, the firm will also market throughout the United Kingdom and Western Europe, graphite products, including electrodes, of the Corporation's concern in the USA.

Notes from the Branches

Slough Section

The Lecture Theatre at High Duty Alloys, Limited, was the venue of the Slough section of the Institute of British Foundrymen for their November meeting, when Mr. G. B. Judd of Mann, Judd & Company, gave a talk on the very intriguing subject of "£ s. d. in the Foundry."

Mr. Judd, who is a born lecturer, kept his audience interested throughout the evening. He commenced by giving details of the present less-happy trading position of the foundry industry, and although he dealt mainly with ironfounding his remarks were equally applicable to the non-ferrous members of the fraternity. He also had a few words to say about those ironfounders ("angels" was Mr. Judd's own term for them) who were quite happy to work for comparatively nothing, and of those who in times of depression were prepared to work at a loss. They did this, he said, without thought of the consequences to the industry as a whole or to their fellow founders. Mr. Judd deplored what he called this "cut-throat" system and was bold enough to say that he felt that the really logical thing to do during periods of reduced activity—and hence increased cost—was to raise prices and conversely to lower them in a boom period. Though this was contrary to the law of supply and demand, it was, he said, undoubtedly less economical to produce smaller quantities of castings. He appreciated that this price system could not in fact be carried out, but he felt very strongly on the subject, especially when lowered prices meant industrial suicide.

Mr. Judd then went on to say that profit was the main reason for carrying on business, and this being so then firms should be prepared to find out how efficient they were at making money. Moneymaking could be developed into a semi-science, he said, one of the most important pieces of equipment being the technique of preparing financial and cost accounts for a business. Too little time was spent on the study of moneymaking; Mr. Judd maintained that this was just as essential to a foundry as the making of a good casting.

Profit and Loss Accounting

With regard to the profit and loss account, the author thought that this was of little use to most concerns except as a means of assessing profit and loss over quite a long period—its main application being for tax purposes. His own method, which he explained in detail, was to have short-period profit and loss accounts for each department, from which monthly assessments could be made of how things were going, without having to guess what each item cost. If the cost of each casting was really known, then there would be less chance of founders "giving what was in fact charity to the customer."

Mr. Judd then spoke about systems used in the USA whereby a group of companies employing a uniform costing system could assess the profit made in each department as a percentage of the average unit, enabling them to take steps to remedy any discrepancies that occurred. By this method, he said, greater efficiency was achieved and ultimately cheaper castings were produced. (Forms used for a similar system by a group of foundries in this country were then passed round for members' perusal.) On this question of standardized costing systems throughout the industry, Mr. Judd told members that sets of forms were soon to be made available for purchase by those who wished to carry out a straightforward costing system; he hoped that eventually they would prove so useful that all founders would adopt them. He also recommended some excellent publications which would help founders to understand, and institute, an up-to-date costing system in their foundries.

The discussion which followed the lecture reflected the keen interest shown by members, many and various were the questions raised. No "punches" were pulled and no grace was given, Mr. Judd, however, on his own ground proved to be more than a match for any of his critics. The meeting was closed with a vote of thanks to Mr. Judd, proposed by Mr. R. Blandy and seconded by Mr. Urwick.

London

The meeting of the London branch, held on December 4, took the form of the annual joint meeting with the London local section of the Institute of Metals. On this occasion, the Institute of Metals was the host and the meeting was held at 17, Belgrave Square, London, S.W.1. In spite of the fog, about 30 members of the London branch joined members of the Institute of Metals to hear Dr. E. C. Ellwood (of the Tin Research Institute) lecture on "Continuous Casting of Bronze." It is estimated that there was approximately 70 people present. The foundrymen much appreciated the opportunity of gaining an insight into processes a little different from their everyday routine, but unfortunately, when it came to discussion time, they were somewhat inarticulate. However, there was a most interesting discussion and Dr. Ellwood answered the various questions in a most able manner. The points raised were mainly of a highly technical nature, concerning the detail of the process developed by the author and other methods of achieving the same ends which he had also described. One speaker thought that progress with continuous casting had been rather slow, as he had been engaged on similar work with "quite difficult" alloys over 25 years ago. Several remarks concerned the possibility that there could be a gaseous phase between the cast rod and its mould at the point of inception of the cast product. Other points raised were the importance of heat-transfer rates, possible speeds of production, die-life, and the relative merits of horizontal and vertical casting. The vote of thanks proposed by Mr. J. Wood, speaking particularly for the "foundry" guests, was seconded by Mr. Strauss.

East Anglian Section

The East Anglian section of the Institute met at Ipswich on November 18, when the speaker was Mr. J. A. Hufton of Coleman-Wallwork Company, Limited, who used two films and numerous slides to illustrate his paper on "Aids in Automation." Mr. Hufton first dealt with the output of moulds per man/hour which could be expected from the conventional mechanized moulding unit, taking into account all the men who would be working on such a plant. He then went on to show the reduction of labour, and consequent rise in production of moulds per man/hour which would be achieved when semi-automatic moulding machines were used, keeping to box parts of the same size. Finally, he described a fully-automatic moulding unit, and gave details of the even greater reduction in labour, and increase in production of moulds, which would result from its use. Although difficult to cover such a subject in the short time at his disposal, the questions which followed presentation of the paper were ample evidence of the interest aroused.

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Notes from the Branches

In opening the discussion MR. WARD said that in a nine-hour day, 240 moulds per hour would add up to 2,160 moulds per day. What, he asked, was the actual achievement and what delays were experienced.

In reply, THE LECTURER quoted an actual example of production for semi-automatic moulding machines of 98, 85, 108 and 115 per pair of machines per hour on 18- by 18- by 4- by 4-in. box-parts. On fully-automatic operation, output was never fewer than 200 moulds per hour for six hours per day.

A MEMBER remarked that in all the examples shown the box-parts were without bars, and asked how the system worked if bars were required.

MR. HUFTON replied that in that case the boxes would be split into sections and poured in more than one place.

MR. BASELOW remarked that in working out the size of an automatic scheme surely the time from pouring to the return of the boxes depended upon cooling time, and the size of the casting would therefore decide the number of boxes needed. He then asked the author if the use of hot sand presented any difficulties.

In reply Mr. Hufton said that cooling time depended upon the length of track which in turn determined the number of boxes. Surprisingly, hot sand had not presented a problem on the plants discussed, where an extra 100 tons of sand had been added to the system. He preferred to apply cooling rather than provide extra storage for sand. He added that provision could be made for automatic spraying of patterns with parting fluid, although pattern heaters were preferable.

Detail Queries

MR. CARRICK asked if separation of box parts occurred on the fully-automatic knock-out.

MR. HUFTON replied that the boxes were double-sided and the cope and drag parts could be interchanged.

MR. CATES said he had noticed in the illustrations that no downsticks were used, and wondered if trouble were experienced with hard spots in the moulds.

MR. HUFTON gave the information that a block on the machine squeeze-board formed the runner cup. This block had a hole through it and a peg was mounted on the patternplate which located in the hole in the block. Regarding hard spots, he said that the pressure plates were almost as important as the pattern-plates and were designed to equalize the squeeze. There were also deflector plates in the sand hoppers to spread the sand in the boxes.

MR. PIZZY who queried the use of shaped pressure plates on drag moulds was assured that there was still enough sand to support the mould. When MR. P. SMITH asked about the ease with which faults could be traced and rectified on automatic plants, MR. HUFTON said that the maintenance staff must be highly qualified, and on a fully-automatic plant an electrician and a first-class fitter would be required.

MR. WHIPP asked how much floor space was required in comparison with an orthodox plant and was told that, excluding space for cooling, the fully-automatic plant would occupy half the area for the same production.

Other Considerations

MR. ASHTON enquired about the price of a fully-automatic moulding plant. Mr. Hufton said that the cost would be £20,000 per pair of machines which would be equal in production to six conventional machines. This worked out at approximately double the cost for the actual moulding capacity, but to be taken into consideration also was the fact that only two hoppers were required and fewer conveyors, etc. In the summation, fully-automatic plant would show very little difference in overall capital cost, but, of course, it was less flexible. To change a pattern-plate took a quarter of an hour per machine with two men. A MEMBER remarked that obviously a sand of consistent properties was essential for the plants discussed, and asked the author which type of mill was to be recommended—batch or continuous? Mr. Hufton said it was easier to control a continuous mill; the reason most founders failed to get optimum results from this type of mill was because they tried to push too much sand through them.

MR. BOLTON pointed out that there still seemed to be plenty of sand spillage around the plant illustrated, and asked what arrangements were made for cleaning up.

MR. HUFTON replied that the plant was cleaned up at the end of each shift by the operators themselves. Fully-automatic plants, he said, were much cleaner than the semi-automatic type—these were the type which had been illustrated.

MR. TOTHAM in proposing a vote of thanks to Mr. Hufton remarked upon the significant choice of subject. It would appear, he said, that automation would increase the capital cost but would decrease the number of man/hours engaged in production. He concluded by making complimentary reference to the slides and films the Author had used.

South Africa

A party of 60 members and guests of the South African branch visited the works of the Dunswart Iron & Steel Works, Limited, Benoni, in October. Departments visited included the rolling mill, steel-melting plant, foundry, patternshop and laboratory. The rolling mill plant consists of a 22-in. "sack" cogging mill, an 18-in. billet and section mill, a 12 and an 8-in. mill, and a Siemag light-section mill. The latter has recently been installed, and was of particular interest to members.

The steel-melting department at present has a monthly capacity of 6,000 tons per month, 85 per cent. of which is delivered to the mill and 15 per cent. to the foundry. Equipment installed consists of two 10-ton Demag and one 5-ton Birlec arc furnaces, and a 15-ton Demag furnace is at present being installed. It is anticipated that this furnace will be in operation by the end of the year when the production will rise to between 8,000 and 9,000 tons per year. Ladle drying is performed by gas heating, using gas supplied from the steelworks' own gas producers.

There are three moulding bays in the foundry, one for small jobbing, another for machine moulding and a third for heavy jobbing work. Sand is supplied from a Simpson sand plant and delivered to the moulding stations on an overhead-conveyor system. The bulk of the metal for the foundry is supplied from the steel melting plant, although the foundry itself has a 2½-ton acid-lined arc furnace and a 600-lb. resistance furnace. The largest casting made to date, a bottom shell for a crusher, was 20½ tons (finished weight). The patternshop is equipped for the production of wooden and metal patterns and the laboratory facilities cater for chemical, physical and non-destructive testing of castings.

The visit was concluded with the provision of refreshments and a short speech by Mr. R. C. Cross, branch president, who thanked the management for their courtesy in arranging for such a successful visit.

Registration of Agreements

By "Barrister-at-Law"

For a restrictive agreement to be registrable under the Restrictive Trade Practices Act 1956, certain essential conditions must be fulfilled. First, there must be an "agreement" between at least two persons carrying on business within the U.K. Second, the business carried on by the parties to the agreement must be in the production of goods, or the supply of goods, or the application of any process of manufacture to the goods. Third, the restrictions imposed by the agreement, in brief, must relate to prices, terms or conditions of supply or acquisition, quantities or descriptions to be produced, processes of manufacture to be applied, or the quantities or descriptions of goods to be produced, supplied or acquired; also persons or classes of person to, for or from whom, or areas or places in or from which goods are to be supplied, or acquired or any process applied. Fourth, there must be an acceptance of restrictions by at least two of the parties to the agreement; if the agreement is between two persons only without any other parties, this requirement will be tantamount to an exchange of restrictions between the parties.

It is not necessary that the agreement should be one which constitutes a contract in the eyes of the law, and one which accordingly confers and imposes respectively legal rights and obligations. Under subs. (3) of S.6 of the Act an "agreement" for this purpose will include any agreement or arrangement, whether or not it is intended to be enforceable by legal proceedings. Therefore it seems a mere "gentleman's agreement" which has not the sanction of the law to back it might equally constitute an agreement for this purpose.

What, however, appears to be essential is that the parties to the agreement or arrangement must at last accept mutual rights and obligations, which, of course, need not have the force of law behind them. This was the view expressed by Mr. Justice Upjohn in the recent important case of in re Austin Motor Company, Limited's agreements, in which the Court decided that the agreements were not registrable under the Acts, because they came within the exception of S.8 (3) of the Act.

Excepted Agreements

Certain agreements are excepted by the Act, and according to subs. (3) the excepted agreements will include any agreement for the supply of goods, between two persons, neither of whom is a trade association, being an agreement to which no other person is a party and under which the only restrictions accepted are (*a*) restrictions by the supplier in respect of the supply of goods of the same description to other persons; or (*b*) restrictions by the party acquiring the goods, in respect of the sale, or acquisition for sale, of other goods of the same description.

In the Austin case, the question for the determination of the Court, was whether certain new agreements which had been made by Austin came within the above exception, as being agreements, for the supply of goods between two persons, containing only restrictions of the kinds above mentioned.

The Registrar, in support of the contention that the agreements fell outside the above exception and were accordingly registrable, relied to a large extent on the background in which these agreements, it was suggested, ought to be viewed. Austins apparently changed their practice in connection with the making of agreements in 1957.

Prior to 1957 Austins had appointed distributors for large areas, who entered into annual agreements with Austins. Within the area of the distributor were two or three dealers who were appointed and who also entered into annual agreements with Austins, to which the area distributor was normally also a party. Under the distributor's agreements the distributor was bound to purchase a number of cars from Austins, a certain proportion of which was to be available for sale to the public direct, and the remainder was to be available for resale in the trade. There were restrictions as to the resale price and provisions as to discounts.

Under the dealer's agreement, which apparently was a tripartite agreement, to which the distributor was a party, the dealer was bound to purchase a certain number of cars from the distributor. There were similarly restrictions as to the resale price and provisions as to the retailer's discount.

Under the retailer's agreement, to which the dealer and the distributor were also parties, so that the agreement was tripartite, there was similarly restrictions as to the resale prices and provisions as to the retailer's discount.

Distributor and Dealers

On February 26, 1957, the whole practice was altered. The new agreements which were entered into by Austins were bipartite. They were entered into by Austins with each distributor and dealer. Under these new forms of agreements, whereas the relationship between Austins and their dealers was unaffected, there was no longer any legal connection between distributor and dealer, or between distributor, dealer and retail dealer. Thus whereas under the old tripartite agreement, Austins were to invoice all vehicles to the dealer through the area distributor at 17½ per cent. discount, under the new agreement Austins were to invoice all vehicles to the dealer direct at 17½ per cent. discount.

Again, whereas under the old agreement, the dealer was to appoint in his territory retail dealers and stocking traders in accordance with Austins nomination, or approval, under the new agreement the dealer was to do so "as agent" of the company. Again, whereas under the old tripartite agreement, the dealer undertook that retail dealers and stocking traders should maintain a stock of demonstra-

Registration of Agreements

tion vehicles in good order, under the new agreement, the dealer gave a similar undertaking "as agent" of Austins.

Each of these new agreements therefore at any rate on their face, were clearly agreements made between two persons with regard to the supply of goods, so that, *prima facie* at any rate, they came within the exception of S.8 (3) of the Act and were not registrable. But it was argued that in effect no change was made in the way that the business was to be done. The commercial efficiency of the whole selling organization depended on the existence of these parallel bilateral agreements, in which Austins was in each case a party. The agreements contained a number of restrictions, on prices and resale and each of the other contracting parties would not have been likely to have entered into them, unless the others likewise were bound by the same restrictions.

Although therefore there may not have been any longer agreements directly made as between distributors and dealers (to which Austins would also have been a party), yet in effect there were mutual arrangements in the form of gentlemen's agreements, as between distributors and dealers.

The bilateral agreements that were made therefore, between Austins and their distributors, and between Austins and their dealers, were in effect to be regarded as tripartite agreements to which in the former cases, the dealers, and in the latter cases, the distributors, were also to be deemed to have been parties.

The Court however rejected this contention. While it was true that an agreement had to be read in the light of its surrounding circumstances those circumstances could not be invoked to alter the interpretation of a document whose terms and operations were clear and unambiguous. The new bilateral agreements accordingly were held to fall within the exceptions of S.8 (3) of the Act, and to be exempt from registration.

This case therefore well illustrates the point that the legal framework of agreements, which would otherwise fall within the provisions as to registration, may be so altered so as to avoid registration. For this purpose however, it seems that it would be necessary that entirely new agreements would have to be executed, and that the agreement would have to be drafted in such a way, as to avoid the provision of the Act as to registration.

SEVEN EMPLOYEES of G. & J. Weir, Limited, engineers, of Cathcart, completed 50 years' service with the company this year, and six of these recently received long-service presentations from the chairman, Mr. J. K. Weir. The seventh, who is now with W. R. Skinner, Limited, a subsidiary of the Weir group, received his presentation from Mr. J. R. Lang, managing director of Weir's, in London. The presentations bring the total of fifty-year veterans at Weir's to 67, twelve of whom are still actively engaged with the company.

Experiments on Core Washes*

Graphite replaced in South Africa by Petroleum-based Materials

Experiments carried out in the foundry of Wright, Boag and Head, Wrightson (Pty.), Limited, Benoni, resulted in enhanced quality of castings, apart from the interesting economies effected.

The experiments started in February this year with the use of a flash-off mould dressing consisting of a bitumen-petrol mix. This wash, although producing a hard skin, gave rather a rough surface, so it was decided to use talc as a filler and carrier and to replace petrol with a petroleum solvent, which is 15 per cent. cheaper, and which gives a lingering flame; the slow-burning solvent gives a deeper penetration of the heat and a greater depth of drying out.

Composition Chosen

Experiments along these lines were continued with various modifications and for different sizes of castings, the largest being a 250 lb. casting. It was eventually found that the dextrin and bentonite additive in the original proportions resulted in too strong a facing sand. The wash finally evolved, now called the "Wright" wash, replaces the dextrin and 50 per cent. of the bentonite formerly used in the facing sand. An independent authority on the CO_2 Process, Mr. R. Laycock, describes this flash-off mould dressing as the best he has used. It is now in current use in the Blakeborough foundry.

With this auspicious start, the foundry team turned to the use of a similar material for jobbing moulding. An emulsified material (Terralas) mixed with talc and water, made into a wash not unlike a plumbago wash gave excellent results. When the Terralas wash was sprayed on to the mould, the mixture appeared to become tacky and adhere to the mould face. This property of "not running away" eliminates waste and makes for cleaner working conditions, as the moulders themselves declare. Moreover, the corners and edges of the mould dry harder, making for easier sleeking and finishing. Moulds treated in this way after drying give a very hard, tough skin which does not "blow" off or rub off.

Local Materials

These bitumen-based materials are locally produced and cheaper than the Northern Transvaal graphite. They give a finish equal to that achieved with the use of the best local or imported graphites and, because of the purity of the materials, are as satisfactory as the best Ceylon graphites for this application. In using the flash-off mould dressing, the proportion of imported bentonite can be much reduced, and other more expensive bonds replaced, in the facing sands.

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Bellfounders of the West Country . . . . . the Pennington Family of Devon and Cornwall

By T. R. Harris

One of the earliest applications of the art of the founder was the production of church bells. During the 17th and 18th centuries a large proportion of the bells supplied to the churches of Devon and Cornwall were cast by members of the Pennington family, who had foundries in both counties. Two of these were at Exeter, and two more in Cornwall, one at Lezant and the other at Stokeclimsland. The Exeter firm of Thomas Pennington flourished from 1618 to 1741, while that of John Pennington was conducted in the same city from 1635 to 1697. The Cornish Penningtons, at Lezant and Stokeclimsland, were not established until 1702, but continued in business until 1819.

John and Thomas Pennington used their initials as bell marks, separated by a figure of a bell. Both used a *fleur-de-lis* ornament, and stops between the words, showing that they may have been partners. At all events, it seems that they worked amicably together. Occasionally both their initials were to be found on the same bell. The Exeter founders had much to do with the bells of Exeter Cathedral during the 17th century. An order dated April 29, 1625, concerns "Grandison bell, nine o'clock bell and the third, thick bell of the ring, which were to be new cast by Mr. Pennington, who was to have for his labour, and all manner of charges belonging to the same, the sum of forty pounds." This order was not executed, but a similar order dated September 5, 1629, records that the founder was to be paid £50.

Itinerant Bellfounding

Although some of the Exeter foundry products were indeed supplied to Cornwall, the majority of the bells in the churches of that Duchy were cast by the Cornish Penningtons, the last recorded order being for a bell completed in 1819, for Liskeard. The Cornish bells carried the initials of John, Christopher, William, Bernard and Fitz Antony. Fitz Antony Pennington, of Lezant, was drowned on April 30, 1768, while crossing a ferry with a bell for the tower of Landulph, in which six bells of his manufacture already hung, ranging from 29 to 41-in. dia. at the bell mouth.

It was probably a member of this branch of the family who migrated to Exeter for a time, for an advertisement in *Brice's Weekly Journal* of May 10, 1728, announced: "John Pennington, Bell Founder, is lately come to settle in the City of *Exon*, and Casts Church Bells of any Size, either in whole Rings, or in Part, and will perform his Work on reasonable Terms, in such a Manner as shall be judg'd by the nicest Ear to be exactly in Tune, and a good Tone, otherwise he expects no Reward. He is ready to give satisfaction to any Person that may question his Ability, by a proof of the Exactness of his Method and Rule, in Working several Rings he has cast in this County, which prov'd to fall exactly in Time from the Mould, without Chipping or Barbing; which frequently spoils the Bell." Absence of information concerning bells of his manufacture suggests that he did not remain in the city for long. The foundry of Thomas Pennington closed in 1741, leaving only the Cornish section. In a later period this branch of the Pennington family became itinerant bellfounders, and cast most of their bells near to the church for which they were intended.

The construction of a temporary casting place, to avoid the heavy expense attendant upon the carriage of a heavy bell from a distant foundry, appears to have been common in Devonshire during the preceding century. Extracts from the churchwardens' accounts of Colyton, for 1611, and Woodbury in 1630, confirm this.

Parish Accounts

The parish accounts of Littleham-by-Exmouth, for 1651, also contain some interesting information relating to this practice, for example one item records the receipt of £2 7s. 4d. from the Parish of Sidmouth towards the charge for "casting of their bell after our bell was cast, and 6s. 8d. for quarry stones sold which were left on the hill whereon the bell was cast." Mr. Pennington was paid £11 2s. 4d. in all for supplying the bells. The sub-letting of the casting pit and furnace (for which the quarry stones were used) to the Parish of Sidmouth was a novel proceeding.

Six bells were cast at Jacobstow, in 1771, ranging from 25¼ to 35-in. mouth diameter, on the glebe near the church. The metal used came from five old bells, additional metal being added as necessary. In 1770, Mr. John Pennington received an advance payment of £25 "in part for the Casting of the Bells," and two years later a further £25 "in full for Casting the Bells." An entry in the parish register of Blisland concerning the first and second bells of their peal states that they were cast between "the houres of four and five of the clocke in the afternoone, by Robert Pennington, *nono die, Marchii*, 1632. The price paid, five pounds."

In Exeter none of the Penningtons served in any of the offices pertaining to the Corporation, but in Cornwall, Christopher Pennington, one of the bell founding fraternity of that county, was Mayor of Bodmin in 1666.

Book Reviews

Bronze und Eisenguss—Bilder aus dem Werden der Giessereitechnic (Bronze and Ferrous Castings—a pictorial record of the progress of foundry technique) (in German), by Hans Schmidt and Herbert Dickmann. Published by Giesserei-Verlag, G.m.b.H., 27, Breitestrasse, Düsseldorf, Germany; price D.M.20.

This 122-page book, brilliantly illustrated by 117 pictures, is a survey of the historical section of the Foundry Exhibition held in 1956 as an adjunct of the Düsseldorf International Foundry Congress. There are 30 pages of text, which in two sections cover "Bronzeguss"—really meaning all non-ferrous metals—and "Eisenguss"—this section, covering both iron and steel, gives the history of foundry practice. The great feature of this book, however, is the pictorial section which is similarly divided between ferrous and non-ferrous, and in it there is—and rightly so—a distinct leaning towards the archaeological and artistic rather than the utilitarian. The information has been culled from both the Orient and Europe. It starts with use of stone moulds dating back to 1,000 B.C. and finishes in 1893 with the casting of the Eros statue which now stands in Piccadilly Circus. As the current demand is for the inclusion of more liberal studies in technological training, the reviewer commends this as a suitable book for this purpose. It will give an enlightening story of the history of foundrywork and awakens interest in its future. This album, gracefully presented, should find a place in every library whose owners have any interest at all in the history of the great craft of founding.

Foundry Manual. Published by the Bureau of Ships, Navy Department, and sold by the Superintendent of Documents, US Government Printing Office, Washington, D.C.; USA; price $3.

This manual, though primarily intended for use by foundry personnel aboard repair ships, is excellent for the general jobbing foundry owner. Obviously he will get no data on cupola melting, as on board ship melting plant is confined to crucible or electric furnaces. It is a very practical book and theory has been kept to a minimum. Such questions as "How Metals Solidify"; "Designing a Casting"; "Sands for Moulds and Cores"; "Gates, Risers and Chills" are splendidly expounded. Moreover, in the second section, the four major alloys used in foundry practice are separately dealt with in great detail. The book runs to over 210 pages and is clearly illustrated.

V. C. FAULKNER.

New Catalogues

High-duty Cast Iron. Being a world-wide organization, the International Meehanite Metal Company, Limited, Meerion House, 4, Downside, Epsom, Surrey, publish in both English and foreign languages, a large quantity of trade and technical literature. Moreover, this is kept well up to date. Amongst those collected by the JOURNAL'S representative during a recent visit to Epsom, one which appealed to the reviewer was a useful wall-chart which sets out the machining speeds and feeds, tool angles and the like, to be used with the various grades of Meehanite. Another group of five catalogues of uniform format represents much that is commendable in group sales literature. The field covered is wide and takes in casting properties of Meehanite metals; materials for dies; for gears and for general-engineering applications. These catalogues take the form of four-page leaflets, excellently displayed, and good use is made of coloured illustration.

Other publications from the same house cover cast bar and other machining stock; specifications; there is a four-page brochure about applications; a list of licensees; two pamphlets from the group's American associates; three reprints of technical lectures, and one publication, in German, for licensees in that country. Dignity and technical interest are characteristic of the whole series. All this literature cannot be made available *ad lib;* however, engineers wishing to have copies of any of the publications should address their requests to Meerion House, using their firm's letterheading.

Pressure-die-casting. High Duty Alloys, Limited, Slough, have used a folder to show some striking examples of complicated components made as pressure-die-castings. One in particular indicates how a dozen or more components have been converted into a single one by the use of this highly-developed process. The latest statistics reveal that aluminium pressure-die-casting production is now of greater tonnage in America than sand-cast aluminium.

Publications Received

Industry's Vital Component—Some uses of Iron Castings. Issued by the Joint Iron Council, 14, Pall Mall, London, S.W.1; post free on application.

So far as the reviewer can recollect, this is the first time that the ironfounding industry has issued a glossy brochure covering a wide range of castings. Perhaps undue stress has been placed on heavy-duty components, but in publicity it is not a bad rule to show the largest and smallest. Thus it is suggested that in the next issue, room be found for a picture of malleable-iron boot-protectors which run 40 to the ounce.

The 27 photographs have been well chosen and splendidly reproduced, and the accompanying captions are crisply written. The objective of this brochure is to show the true significance of iron castings to the prosperity of the general industry of this country. This has certainly been accomplished and the publicity department of the Joint Iron Council is to be congratulated on having turned out a worthwhile job.

FBI Register of British Manufacturers—1959 (31st edition). Published for the Federation of British Industries by Kelly's Directories. Limited, and Iliffe and Sons, Limited, Dorset House, Stamford Street, London, S.E.1; price 42s. post free.

This excellent directory covers the 7,500 member-firms of the Federation of British Industries. It records the products and services they give, set out under 5,400 alphabetical headings. The fact that the directory has reached its 31st edition shows that it is responding to the needs of these members. Its usefulness is added to by the inclusion of French, German and Spanish sections.

Facts and Figures about British Railways, 1958 Edition. Published by the British Transport Commission, 222, Marylebone Road, London. N.W.1; free on application.

Fathers of families will find this booklet of the utmost help in answering junior's queries as to which is the longest tunnel or largest railway station and so forth. There is, however, a more serious aspect of the publication, as trends of progress are clearly set out in the form of graphs. The reviewer still finds much interest in the facts and records presented regularly in this form.

AIME Electric Furnace Conference

The American Institute of Mining, Metallurgical and Petroleum Engineers held their Electric Furnace Conference recently at Detroit, Michigan from December 3 to 5. Abstracts of four of the papers presented at the conference are given below.

Effect of Phosphorus and Sulphur Content on Ductility and Toughness of Cast Low-alloy Steels

*By John Zotos**

* Assistant chief of experimental foundry branch, Rodman laboratory, Watertown Arsenal, Watertown, Massachusetts.

Castings of low-phosphorus and low-sulphur 1045, 4140; high-nickel 4325, 4330, and high-silicon 4340-type steels were produced using a specially developed basic electric-arc furnace melting practice. The operating procedure established for producing high-quality, low-sulphur and low-phosphorus cast steel is described in 18 detailed steps.

The process consists of an oxidation by oreing with a limestone plus iron-ore mixture for about one hour, at which time the first slag is removed, taking with it much of the phosphorus as calcium phosphate. A wash slag of limestone and fluorspar is applied for the next 30 minutes, and then removed. Reducing agents in the form of ferro-silicon, ferro-manganese and " carborite " are added, followed by a pre-mixed limestone, fluorspar, ferro-silicon flux dusted with coke, shaped up to maintain high basicity and remove the sulphur. The metal is then adjusted for composition and temperature, deoxidized and poured.

The various steels produced were cast into 6-in. and 8-in. billets (1045, 4140, and high silicon 4340); 90-mm. breech rings and test samples (high-nickel 4325), and 280-mm. shell bodies and test samples (4330). The castings were then processed and evaluated for their chemical and physical properties. It was found that the ductility and impact resistance of the high-nickel 4325 and 4330 cast-steels were significantly improved by the reduced phosphorus and sulphur content.

Pinhole Porosity in High-alloy Steel Castings made in Green-sand Moulds

By R. J. Mangone, A. M. Hall, W. T. Bryan, and C. E. Sims†*

* Principal metallurgist, division chief, and consultant, respectively, Battelle Memorial Institute, Columbus, Ohio.
† Manager, Custom Product Sales, The Duriron Co., Dayton, Ohio.

Attention has been directed toward the occurrence of pinhole porosity in high-alloy steels of the stainless type. Two general factors seem to contribute toward the hydrogen content of the melt. One of these factors is the concentration of hydrogen in the metal being poured into the mould. The other factor is the contribution made by hydrogen diffusing into the melt through the freezing skin, a product of the reaction between the metal and the steam from the mould.

It would seem logical to speculate that pinhole porosity in stainless steels could be brought under control by the use of strong deoxidizers. Aluminium additions of up to 0.6 per cent. were made to 200-lb. experimental melts of the 21 chromium, 9 nickel, casting alloys, grade CF-8. No beneficial effects were observed relative to the incidence of pinhole porosity.

It has been demonstrated that a small addition of selenium to stainless-steel melts can alleviate or eliminate pinhole porosity in castings made in green-sand moulds. The mechanism by which selenium does this is not known, but it is possible to speculate with either a chemical or a physical viewpoint.

The results of this investigation show that the important foundry variables influencing pinhole porosity in stainless-type castings are melt hydrogen content, pouring temperature, and mould moisture content. For example, the interrelated effects of melt hydrogen and pouring temperature are shown for castings made in mould containing either 3 or 4.5 per cent. moisture.

This indicates what control is necessary of both melt hydrogen content and mould moisture to achieve sound castings.

Desulphurization of Steel by Injection of Lime and Aluminum/Magnesium

By D. E. Parsons and S. L. Gertsman**

* Scientific officer, and chief, respectively, Physical Metallurgy Division, Mines Branch, Ottawa.

Acid Steel

Acid steel sulphur contents were reduced from 0.05 to 0.025 per cent. in a 60- to 90-second ladle treatment in steels of approximately the following composition:—0.25-0.35 C; 0.40-0.60 Mn; 0.30-0.80 Si, and 0.03 P.

The usual injected charge consisted of 18 lb. per ton calcined lime, and 6 lb. per ton aluminium/magnesium alloy. Reductions of the order of 20 per cent. were obtained when acid steel, with the slag removed, was treated in the ladle by the injection of 18 lb. per ton calcined lime without any aluminium/magnesium alloy. Chemical analyses of the slags produced when the desulphurizing mixture was injected into steel (held in the ladle) showed that synthetic basic slags were formed, and that these slags contained up to 3 per cent. sulphur.

Mechanical properties of the acid steel when normalized for two hours at 930 deg. C., then tempered for two hours at 650 deg. C., and air cooled, were in the range:—29.0 to 35.7 tons per sq. in. strength; 17.8 to 22.3 tons per sq. in. yield; 25 to 35 per cent. elongation; 120 to 140 Brinell.

When the steel was treated in the furnace, rather

AIME Electric Furnace Conference

than in the treatment ladle, sulphur reductions were still obtained, but a complex double-slag procedure was required. The furnace tests were not as successful as the ladle tests.

Basic Steel

Basic electric steel in 500-lb. melts was desulphurized, from 0.020 per cent. initial sulphur to 0.008 per cent. final sulphur, by injection of 24 lb. per ton calcined lime, and 6 lb. per ton aluminium/magnesium alloy, into the molten metal, held under a basic slag in the arc furnace immediately prior to tapping. Treatment time was approximately two minutes. Sufficient deoxidation occurred during injection to allow casting without further addition of aluminium to the ladle. Injection also agitated the reducing slag and provided an argon flush before tapping.

The actual, "melt-in," sulphur content of the bath was usually of the order of 0.030 per cent., but part of this sulphur (down to approximately 0.020 per cent.) was removed by the conventional basic slag practice prior to injection.

Care was necessary in controlling the residual aluminium content of the metal, since when 6 lb. per ton Al/Mg (3 lb. per ton Al) was injected, any extra additions of aluminium to the stream or ladle resulted in a residual aluminium content in excess of 0.10 per cent.

Intergranular fracture of the "rock-candy" (aluminium nitride) type, and low ductility, resulted in some of the basic-arc furnace melts because of the high recovery of injected aluminium, which, together with the 2 lb. per ton stream additions, gave residual aluminium in excess of 0.15 per cent.

Keel-block samples taken before and after treatment of certain heats were normalized from 899 deg. C. (1,650 deg. F.), tempered at 649 deg. C. (1,200 deg. F.), and machined into duplicate 0.505-in. dia. tensile test-bars. The average tensile properties are shown in Table 1.

TABLE 1.—*Mechanical Properties of Basic Melts Before, and After, Injection in Arc Furnace.*

Heat No.	Tensile strength, lb. per sq. in.	Yield, lb. per sq. in.	Elongation, per cent. (2 in.).	Reduction of area, per cent.	Brinell hardness.	Carbon, per cent.	Sulphur reduction per cent.
Single-slag Basic Melts.							
565 before ..	40.0	24.9	30.0	56.5	183	0.25	50
565 after ..	38.0	22.7	32.0	54.4	170	0.25	
570 before ..	42.2	22.6	25.5	42.1	187	0.39	47
570 after ..	38.1	21.6	25.0	38.2	167	0.39	
Double-slag Basic Melts.							
580 before ..	38.6	21.0	29.5	50.8	174	0.29	47
580 after ..	35.7	19.6	32.5	46.3	159	0.29	
581 before ..	39.0	21.2	26.0	42.2	170	0.30	36
581 after ..	40.8	22.7	28.0	50.6	179	0.30	

High-frequency Induction Melting of Steel in Units up to 5½-tons Capacity

By James T. Gow and C. Franklin Hamilton**

* Vice-president in charge of manufacturing and engineering; and Manager, Production Control Department, respectively, Sandusky Foundry & Machine Company Sandusky, Ohio.

Special melting facilities are required in the production of centrifugally-cast cylinders, ranging in size from 50 lb. to 28 tons each in steel, and a maximum of 37 tons each in the copper-base alloys.

Furnace Refractories and Lining Practices

All the ferrous melting furnaces are lined with a basic refractory composition of 60 per cent. fused MgO, and 40 per cent. fused Al_2O_3. The approximate life of the linings, and cost of the refractory, in the nine furnaces are given in Table 2.

Armco ingot iron, and 0.02 per cent. carbon (max.) grade of ferro-chromium are used for the 0.03 per cent. carbon (max.) grades of stainless steel, as well as electrolytic nickel and manganese, as no carbon is removed on melting. The machine shop returns that are used in the charge have been completely degreased in boiling trichlorethylene liquid and vapour. All heats of ferrous-base alloys receive a calculated addition of oxygen as metal oxide to the cold charge. For nickel-containing steels, a nickel oxide addition supplies the oxygen. For all other steels, an iron-ore addition is used. No slag is intentionally added to the furnace, and details of melting, purging, adjusting and deoxidizing the metal are spelled out in itemized tables.

TABLE 2.—*Lining Life and Refractory Cost of Nine Furnaces.*

No. of furnaces.	Furnace capacity, (lb.).	Average lining life (No. of heats).	Refractory cost per ton of steel melted (dollars).
5	11,000	35	8.80
1	5,000	50	6.10
1	2,000	55	4.60
1	1,000	75	4.00
1	500	100	2.90

The author concludes that the best possible refractory life and uniformity of refractory performance are not yet being obtained. Also, as with arc-furnace melting, there is still work to be done to achieve at all times full control of the degassing of the metal. However, metal of good quality is being produced constantly.

News in Brief

A 100-TON STEAM TURBO-ALTERNATOR, made by Belliss & Morcom, Limited, of Birmingham, left the company's works for Russia in the week of December 15-20. The alternator, valued at £120,000, is believed to be the largest of its type built in Britain.

ONE HUNDRED SHEFFIELD FIRMS employing apprentice engineers, are displaying posters advertising the "Apprentice of the Year" competition, organized by Sheffield Chamber of Commerce in conjunction with its opposite number in Paris. The selection from entrants will take place in the New Year, and the final interview will be before a board of local industrialists and a member of the Chamber of Commerce. The winner will get a fortnight's holiday in Paris at Easter.

BRADFORD FIRE BRIGADE was summoned to the works of Crofts (Engineers), Limited, Thornbury, Bradford, recently, when a fire had broken out in a welding bay in the steel foundry. The foundry is unoccupied between 6 and 9 p.m., and the fire was discovered at 8 p.m. Firemen restricted damage to wooden boards and power cables, and according to Mr. P. N. Southern, personnel manager, nobody was injured and the fire would not interfere with production.

THE BICC GROUP has been awarded a contract by the Indian Railway Board for the design, supply and installation of 25 kv 50-cycle, single-phase a.c. overhead equipment. The approximate value of the contract, obtained against keen international competition, is £2,500,000 of which about 60 per cent. will be spent in Indian currency on locally manufactured materials and the local staff and labour costs, while about 40 per cent. will be in materials to be supplied from the United Kingdom.

JUNIOR EMPLOYEES of Thomas Firth and John Brown, Limited, received more than 100 awards for progress at further education classes at the Atlas Works, Sheffield, on December 12. They were presented by the Lord Mayor, Alderman J. W. Holland. Dr. C. Sykes, managing director, presented the Apprentices Cup for the best apprentice of the year to 19-year-old Kendal J. Chambers. The Research Cup was awarded to 19-year-old Colin Jackson. Mr. G. May, the company's chief welfare officer, said 200 junior employees sat for various examinations in the 1957-58 session.

THE FIRST CHRISTMAS PARTY for the children of employees at the Brownhills works of Castings, Limited, was a great success. Held in the canteen of the Lichfield Road factory, it was given by the 70 workers at this two-year-old branch of the well-known Walsall firm. The idea of the party was adopted three months ago, and members of the sports and recreational association paid a weekly contribution. It was with some pride that they announced their intention to their Walsall colleagues with whom they carry on a good-natured rivalry in matters of this sort. As the Walsall employees have arranged a pantomime in the New Year, honours are even, however.

KIDSGROVE URBAN COUNCIL have asked Staffordshire County Council to reconsider an application from Mr. W. E. A. Lea of Hillsyde Foundry, Clare Street, Harriseahead, to use land for foundry buildings. The County Council recommended that permission should be refused because "the site is allocated for residential purposes on the draft-town map and the proposed development would be detrimental to the amenities of the area." Alternative land allocated for industrial development is available where the proposed use would be more appropriate, they say. Kidsgrove Council agreed to refer the matter to the County's Excepted Applications Sub-committee with a recommendation that permission to develop should be approved for 15 years.

BECAUSE OF COMPLAINTS of noise from the occupants of nearby houses, Smith's Stamping Works (Coventry), Limited, have decided to end night-shift working from December 23. This decision has been reached after the firm has spent £10,000 over the last 18 months in unsuccessful attempts to eliminate the noise nuisance. This has included the lagging of the factory in order to keep the sound inside, and the erection of a hoarding 100-ft. long and 25-ft. high, composed of sound-absorbent material, between the factory and the houses. However, these measures have failed to satisfy Coventry Corporation, to whom the complaints have been made, and the management is left with no alternative but to end night working. It is hoped that the redundant night-shift workers will be found jobs on the day shifts.

YORKSHIRE ENGINE COMPANY, LIMITED, Sheffield, has completed the first of three 400 h.p. diesel-electric locomotives, ordered at a cost of over £100,000, for the African Manganese Company's mining project in north-west Guiana. The engine was scheduled to leave for British Guiana on December 19, from Liverpool and then to Trinidad where it will be loaded on a barge. The locomotive is based on the company's twin-engined Janus 400 h.p. six-wheeled coupled engine which is used for heavy industrial shunting in many industries. The new design has been adapted to a double bogie-wheel arrangement for export purposes. The Yorkshire Engine Company has also completed the sixth of a batch of ten 230 h.p. 31-ton diesel-electric locomotives for the Durgapur iron and steel works in India. The first five have already been delivered.

AT THE HALF-YEARLY MEETING, in Birmingham, of the National Association of Non-Ferrous Scrap Metal Merchants, members expressed the wish to be afforded greater protection by the police against the hazard of buying stolen metal. It was stated that in some counties, information concerning stolen metal was not received by merchants until up to 48 hours had elapsed. Mr. R. O. Barnett, Arthur E. Milner (Metals), Limited, Sutton Coldfield, said that in his opinion the police had a good system for rapidly circulating information concerning stolen jewellery, and there seemed to be no reason why metal merchants should not receive information earlier about stolen metal. It was agreed at the meeting that an attempt should be made to standardize an improved system of circulation of such information throughout the country.

BRITISH WATERWAYS (N.E. DIVISION) are introducing a "direct to the Continent" container service at "all in" rates for traders and industrialists in the West Riding, South Yorkshire and East and West Midlands areas. By this service containers will be taken to firms' premises in this country for loading, then by road to the nearest Waterways depot for transport by barge to ships' sides at the Humber ports of Hull or Goole. These ports have linking services with Gothenburg; Karlstadt; Bergen; Oslo; Copenhagen; Amsterdam; Rotterdam; Hamburg and Antwerp, from all of which the containers will be delivered by road. The specially-designed containers of reinforced fibre-glass for this British Waterways door-to-door service to the Continent measure 7 ft. 6 in. by 6 ft. by 6 ft., with a capacity of 270 cub. ft. which enables them to carry up to four tons of cargo. Specimen containers are at present on display at the Waterways depots at Leeds, Sheffield and Nottingham.

Personal

Mr. H. W. D. WINKWORTH has been appointed to the board of Saunders-Roe, Limited, as works director.

Mr. A. DOUGLAS SHARP has been appointed a director of the Brightside Heating and Engineering Company, Limited.

Mr. F. L. GIBSON, who joined Wolf Electric Tools, Limited, eight years ago, has been appointed sales manager for the home market.

Mr. D. BRUCE-GARDNER and Mr. E. V. CALLIN, directors and joint general managers of John Lysaght's Scunthorpe works, have been appointed joint managing directors.

Mr. H. M. BAKER, chief mechanical engineer and a director of C. A. Parsons & Company, Limited, Newcastle-on-Tyne, has been appointed general manager of the company.

Mr. E. J. APPLEBY has been appointed a director of Qualcast, Limited, and continues as secretary. Mr. A. D. GATENBY and Mr. J. P. E. JOHNSON have been appointed departmental directors.

Mr. F. LIMB, O.B.E., has resigned from the position of managing director of Steele and Cowlishaw, Limited, Stoke-on-Trent. Mr. J. B. CAPEY, previously director and general manager, succeeds Mr. Limb who remains on the board of the company.

Mr. RICHARD MILES, chairman of Head Wrightson & Company, Limited, engineers and foundrymen, of Thornaby-on-Tees (Yorks), is now visiting the company at Johannesburg and its associate company, Wright, Boag & Head Wrightson (Pty.), Limited.

Mr. J. BRUNTON, a foundry inspector at Rolls-Royce, Limited, Derby, has retired after 40 years' service with the firm. On behalf of his colleagues Mr. H. Williamson, superintendent of inspection, presented Mr. Brunton with a Crown Derby tea service.

Mr. G. C. R. ELEY, will resign from the board of the Hawker Siddeley Group at the end of this year. He has joined Richard Thomas and Baldwins, Limited, as an additional deputy chairman and will succeed Sir ERNEST LEVER as chairman of that company in April, 1959.

Mr. L. GRAINGER has been appointed head of the metallurgy division in the United Kingdom Atomic Energy Authority's research group at Harwell. He is to succeed Dr. H. M. FINNISTON, who is being released by agreement to take up an appointment with the Nuclear Power Plant Company.

Mr. K. A. HOGAN, who is a director of Powell Duffryn, Limited, of Stephenson Clarke, Limited, and of other companies in the Powell Duffryn group, will be relinquishing those directorships with effect from the end of March, 1959, in order to take up another appointment. His advice will, however, continue to be available to the group.

A young Hamilton metallurgist, Mr. ALEX MCLEAN, has completed a notable "double" at the Royal College of Science and Technology, Glasgow, by gaining two scholarships—the John Bell Travelling Scholarship and the Greenock Research award. Mr. McLean, who is 22, graduated as a B.SC. at Glasgow in June, and earlier this month received the award of A.R.C.S.T.

Sir FREDERICK HANDLEY PAGE, a vice-president of the City and Guilds of London Institute, has been re-elected chairman of the Institute's Council. Brigadier-General Sir HAROLD HARTLEY, Mr. ARTHUR M. HOLBEIN and Sir GEORGE NELSON have been appointed vice-presidents of the Institute. Professor R. S. HUTTON, a vice-president, has been elected vice-chairman of the Council.

The Board of Trade announce that Mr. A. N. HALLS, M.B.E., the Regional Controller, Midland Region, will be temporarily attached to the headquarters division of the Board of Trade dealing with the distribution of industry. He will have special responsibility for expediting action throughout Great Britain to promote industrial development in areas of high and persistent unemployment.

Mr. C. K. GREGORY, group production manager, General Refractories, Limited, presented long-service awards at the Deepcar Works sports club dinner at Stocksbridge Victory Club Hall, Sheffield, on December 13. Mr. J. S. SMITH, Wharncliffe Works manager, received a gold wristlet watch in respect of 25 years' service, and Mr. T. RICHARDSON and Mr. A. E. WATKINSON, who had previously received watches, were given illuminated addresses from the directors for 45 years' service.

Visiting the Woolston yard of John I. Thornycroft & Company, Limited, at Southampton on Thursday, December 18, Princess Margaret was received by Lt.-Cmndr. J. W. THORNYCROFT, managing director of the company. The Princess launched the anti-submarine frigate Otago for the Royal New Zealand Navy. On the same day, at Westminster Pier, the Duke of Edinburgh, as president of the Missions to Seamen, received the society's new ship John Ashley from the builders, John I. Thornycroft & Company. Mr. ROGER THORNYCROFT, a director of the company, presented the owner's certificate to the Duke.

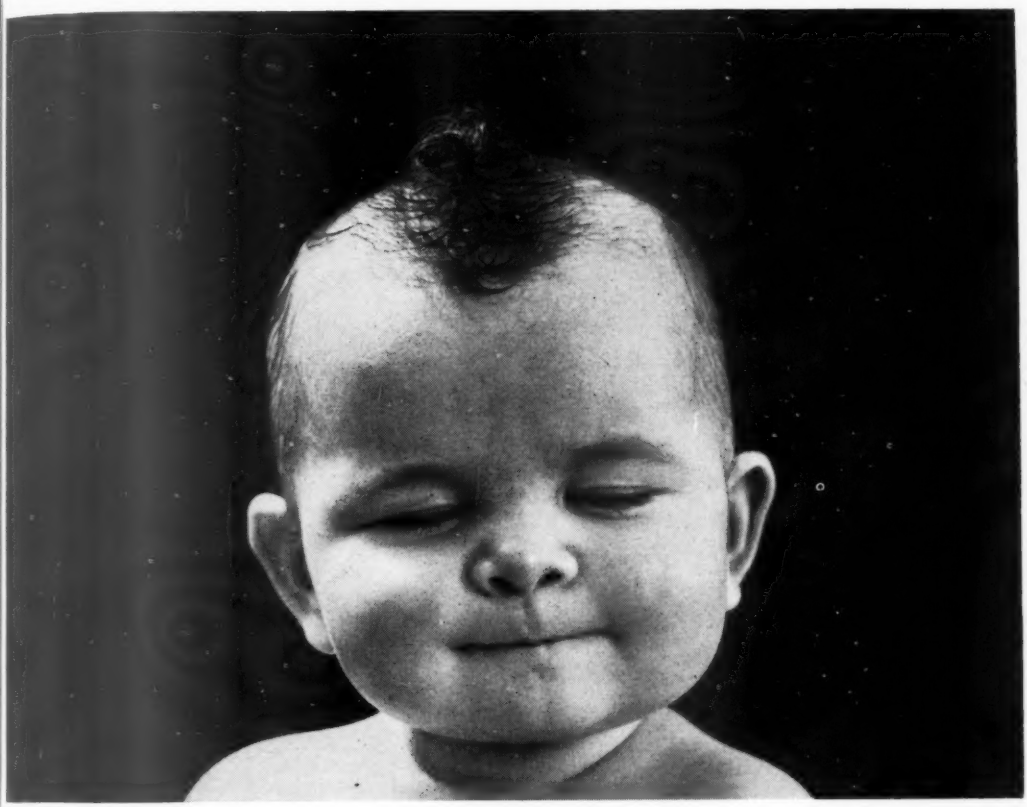
Obituary

The death has occurred at the age of 68 of Mr. JOHN E. LOWE, a director of the Warrington Red Moulding Sand Company, Limited, Warrington, Lancs.

The death is announced of Sir JACKSON MILLAR, C.B.E., D.L., chairman since 1946 of Albion Motors, Limited, and a director of Leyland Motors, Limited, and Scammell Lorries, Limited, as well as a number of other companies. During the second world war, Sir Jackson Millar became regional controller in Scotland to the Ministry of Supply, and later to the Ministry of Aircraft Production and the Ministry of Production. He was awarded the C.B.E., in 1943, and was made a Knight Bachelor in 1957. He had been a Deputy Lieutenant of the County of the City of Glasgow, a Justice of the Peace and a member of the South of Scotland Electricity Board.

National Society of Master Patternmakers

A visit to Keresley Colliery, Coventry, has been arranged by the National Society of Master Patternmakers, to take place on January 14, 1959. Preceding the visit, luncheon will be partaken of at the Smithfield Hotel, members assembling at 11.30 a.m. for 12 noon; the cost of the luncheon being 17s. 6d. per head. The hotel is opposite Coventry Hippodrome and a car park is nearby in Pool Meadow. The party, which the NCB in the interests of safety limit to 20 in number, will leave the hotel at 1.30 p.m. to arrive at the colliery at approximately 2 p.m. Applications to attend will be dealt with in order of receipt, and those wishing to be included should notify the secretaries, Fisher & Firkins, 12, Cherry Street, Birmingham, not later than January 5.



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Company Meeting

Hale & Hale (Tipton)

IMPORTANCE OF MODERNIZATION

The 22nd annual general meeting of Hale & Hale, (Tipton), Limited, was held on December 18 at Dudley, Mr. R. C. Leppington (Vice-Chairman and Managing Director) presiding in the unavoidable absence of the Chairman, Mr. W. Edgar Hale, M.I.MECH.E.

The following is an extract from the Chairman's circulated review:

I would like to emphasize at once that the year has been a most difficult and disappointing one. The Consolidated Trading Profit for the year amounts to £93,689, as compared with £96,342 for the previous year.

Taxation requires £22,638, and after various adjustments, there remains a consolidated Net Profit of £18,884, as compared with £26,701.

The past 12 months' working has been extremely difficult, although the car industry has kept up remarkably well. Over the year there was a considerable falling off in business generally, due in large measure to the credit squeeze, bringing about stock reductions and cuts in delivery dates by customers.

Your Board's attention is constantly directed towards research into possible improvements in our methods and equipment, and we have every reason to be satisfied with their efforts in that important direction. A careful watch is at all times kept on any new possibility for the use of our materials, and the amount of development going on at present is most encouraging.

Subsidiaries

CHATWINS, LIMITED: The continued fall in demand for Solid Fuel Appliances over the last few years was accelerated during the current year. It is becoming increasingly clear that we were wise in devoting so much of our attention to the new "Sunbeam" Smoke Consuming Stove, as it is certainly the most advanced appliance of its kind available in this country, or indeed the world. Demands for this Stove are building up to a healthy level. There was a heavy fall in demand for Oil Heaters, but the present outlook is much more encouraging.

J. & J. WHITEHOUSE (TIPTON), LIMITED: This Subsidiary trading under the name of "Phœnix" and producing cast-iron hollow-ware for export, continues to hold its own.

HALE ENAMELLERS, LIMITED: I am pleased to report a much brighter outlook in the affairs of this Subsidiary than has appertained for a long time.

J. WAKEFIELD & SONS, LIMITED: This company is our latest Subsidiary and it manufactures a variety of paraffin heating and lighting appliances. A great amount of reconstruction was necessary to fit this small organization into a workable unit, but these efforts are now beginning to bear fruit and its future prospects are much brighter.

A rough estimate of the percentage of our output exported would, I think, be about 60 per cent., and with a turnover such as your company enjoys, this represents a figure of no mean importance. I think that world trade will expand generally, and particularly in the case of our own country, the future should be bright provided our costs of production can be kept around present-day values.

The report was adopted.

Changes of Name

Among companies which have recently changed their names are those listed below. The new titles are given in parentheses.

W. & T. AVERY, LIMITED, Soho Foundry, Birmingham 40 (Averys, Limited).

L. WARD (PRECISION ENGINEERS), LIMITED, 80 "B," Cranbrook Road, Ilford (Parall, Limited).

BUILT METALS LUBRICANTS, LIMITED, 109, Cornwallis Road, London, N.19 (Metal Doctors, Limited).

COVENTRY REFRIGERATOR COMPANY, LIMITED, Northfield Road, Coventry (Target Engineering, Limited).

HIGHBURY METAL COMPANY, LIMITED, 30, Highbury Place, London, N.5 (Industrial Vac-Air, Limited).

SAYVOIL, LIMITED, piston ring manufacturers, etc., of 28, High Street, Southend-on-Sea (Kay Rings, Limited).

ELIZABETHAN ENGINEERING COMPANY, LIMITED, 8, Queen Street, London, E.C.4 (Morgan & Boniface, Limited).

TRIANGLE TEXTILE MACHINES, LIMITED, Leicester Road, Hinckley, Leics (Tritex Engineering, Limited).

HENRY GIBBONS & SON, LIMITED, 2, Quay Street, Fareham, Hants (Gibbons Foundry (Fareham), Limited).

MONTAGUE SHEET METAL WORKS, LIMITED, 9a, Montague Road, Leicester (M. S. M. Air Conditioning, Limited).

WINLOW WILSON (WORKSOP), LIMITED, Morthen Road, Thurcroft, near Rotherham (Industrial Pumps, Limited).

DICKIN BROS., LIMITED, 168, Corporation Street, Birmingham 4 (Alexander Comley (Foundry Division), Limited).

HALL ENGINEERING INDUSTRIES, LIMITED, 54, Grosvenor Street, London, W.1 (Hall Engineering (Holdings), Limited).

TARGET ENGINEERING COMPANY, LIMITED, 13, Eaton Road, Coventry (Atkins Engineering (Southbourne), Limited).

CHARLES JONES (ENGINEERS), LIMITED, 242/252, London Road, Staines, Middx (Charles Jones Developments, Limited).

GEORGE PAULING, LIMITED, engineers, etc., of 68, Home Park Road, London, S.W.19 (Home Park Properties, Limited).

PENTABURN, LIMITED, 10, New Court, Lincolns Inn, London, W.C.2 (Millom Hematite Ore & Iron Company, Limited).

HORWICH STEEL CONSTRUCTION COMPANY, LIMITED, Bridge Works, Horwich, Lancs (Horwich Steel Company, Limited).

JOHN LUND, LIMITED, machine-tool makers, etc., of Eastburn Works, Cross Hills, near Keighley (Landis Lund, Limited).

KEELAVITE ROTARY PUMPS & MOTORS, LIMITED, Birmingham Road, Allesley, Coventry (Keelavite Hydraulics, Limited).

REGNIS & COMPANY, LIMITED, machinery dealers, etc., of 10, Greek Street, London, W.1 (Impregnis & Company, Limited).

H. R. GRAHAM, LIMITED, marine engineers, etc., of The Firs, Tintagel Road, Wokingham, Berks (Stilson Marine, Limited).

AVERYS, LIMITED, manufacturers of weighing machines, etc., of Soho Foundry, Birmingham 40 (W. & T. Avery, Limited).

LANGLABURN, LIMITED, Great Western Trading Estate, Park Royal Road, London, N.W.10 (K. S. Paul (Machine Tools), Limited).

HASLAM & STRETTON (ENGINEERING & MOTOR UTILITIES), LIMITED, 227, Stapleton Road, Bristol 5 (Haslam & Stretton, Limited).

CLIMAX ROCK DRILL & ENGINEERING WORKS, LIMITED, 44, Brook Street, London, W.1 (Climax Rock Drill & Engineering, Limited).

ANDREW MACHINE CONSTRUCTION COMPANY, LIMITED, Woodbank Works, Turncroft Lane, Stockport (Andrew Air Conditioning, Limited).

KEMPSONS (BIRMINGHAM), LIMITED, 31, Abbeydale Road, Northfield, Birmingham 31 (Queslett Tools (Birmingham), Limited).

LAWTON (ENGINEERS & BRASSFOUNDERS), LIMITED, Church Works, Furlong Road, Tunstall, Staffs (Lawton Engineers, Limited).

UNETT GENERAL ENGINEERING COMPANY, LIMITED, 46, Hallam Street, Balsall Heath, Birmingham 12 (Geometric Prototypes, Limited).

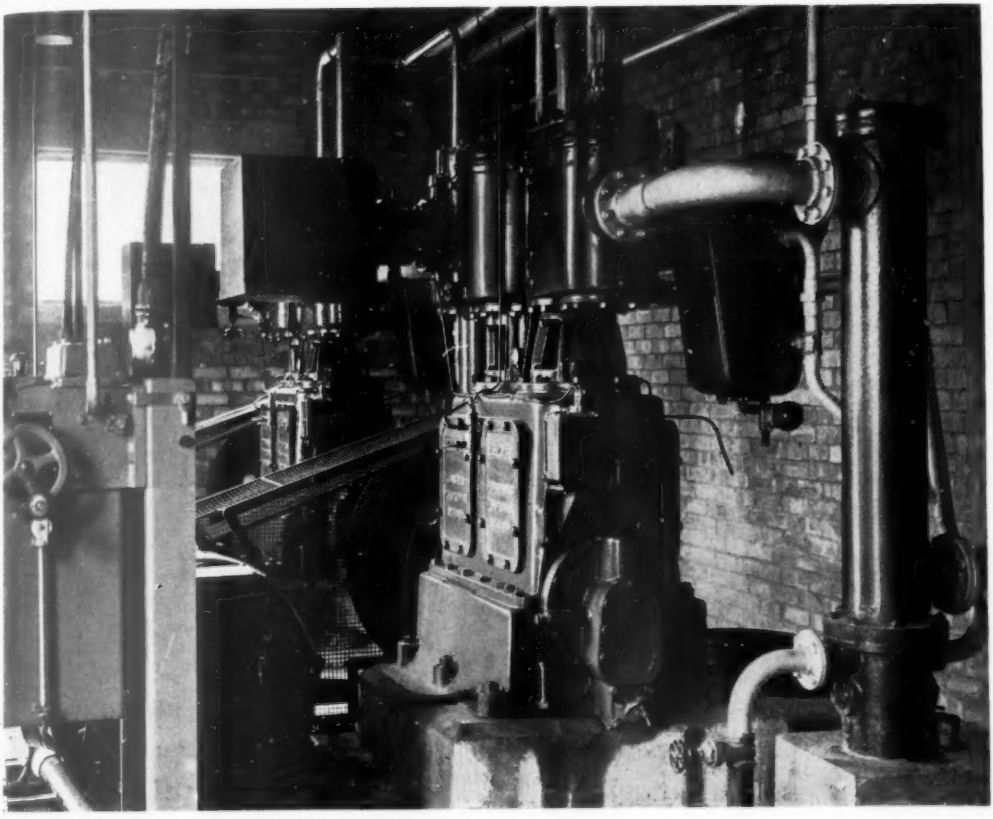
REFRIGERATION ENGINEERING COMPANY (BOROUGH), LIMITED, 111, Borough High Street, London, S.E.1 (Refrigeration (Borough), Limited).

WILLIAM MELLARD & SONS, LIMITED, iron merchants, etc., of 18, High Street, Newcastle-under-Lyme, Staffs (W. M. Investments, Limited).

NETHERTON IRON, CHAIN, CABLE & ANCHOR COMPANY, LIMITED, Netherton Ironworks, Dudley, Worcs (N. Hingley & Sons (Netherton), Limited).

THE OWEN ORGANIZATION announces the formation of a new company to serve its interests in India—it is the Mahindra Owen Private Limited, Gateway Building, Apollo Bunder, Bombay, 1, India.

THE WEST RIDING OF YORKSHIRE BRANCH of the Institute of British Foundrymen is to hold a meeting at the Bradford Institute of Technology on January 3, 1959. The paper to be presented is entitled "S.-g. Iron," the joint authors of which are Mr. J. McPherson and Mr. S. Illingworth.



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579 SAS

Company News

Steel Company of Wales, Limited

In addition to a final dividend of 3 per cent, which makes an unchanged total of 6 per cent. for 1957-58, the Steel Company of Wales, Limited, announces a special interim declaration of 3 per cent. for the current financial year. Trading surplus expanded by £3,201,466 to £22,181,916 in the year ended September 30, 1958, and the net profit of £5,538,847 compares with £4,656,664 previously. In the March, 1957, offer for sale it was forecast that by January, 1958, the trading surplus would be running at the rate of £20,000,000 per annum.

Referring to the 8 per cent. dividend forecast made in respect of 1957-58, the chairman, Mr. Harald Peake, says that the directors decided to maintain the previous year's rate following the changed profits tax basis and to declare a special interim dividend, thereby distributing 1 per cent. more than had the forecast been rigidly adhered to.

This special interim will not be brought into consideration when the further interim and final dividends in respect of the year to September 30, 1959, are declared. Mr. Peake adds that shareholders may expect to receive an interim dividend of 3 per cent. next July, the final depending on the trading results of the year.

Colvilles Report Drop in Orders Now Less Severe

Despite a drop of about 6 per cent. from £11,860,771 to £11,152,075 in group profits and other income of Colvilles, Limited, steelmakers, of Glasgow, the total dividend for the year to September 30, 1958, is maintained at 13 per cent. on the £10,000,000 ordinary capital. The final is unchanged at 8 per cent.

The demand for all products suffered a recession during the latter half of the year and the level of operations had to be reduced. The decline in the flow of orders, however, is now showing some signs of slowing down. After depreciation, heavier taxation and debenture interest charges, and again transferring £2,000,000 to general capital reserve, the balance is £1,571,850 (£3,194,417).

During the year group output (with 1956-57 figures in parentheses) was as follows:—Coke, 783,364 (753,921) tons; pig-iron, 918,942 (789,377) tons; steel ingots and castings, 1,847,063 (2,095,274) tons.

John Summers' Dividend Increased

Total dividend of John Summers & Sons, Limited, steelmakers, of Shotton (Ches), is being raised by 2 per cent. to 16 per cent. for the year to September 27, 1958. Following the increase in the interim from 4 per cent. to 6 per cent., the final is maintained at 10 per cent. Group profit rose by nearly £1,400,000 to £12,554,521 and after heavier charges for depreciation and tax, the balance is up from £4,259,253 to £4,848,404.

The net cost of the ordinary dividend total is £1,242,000 (£983,250). The 1956-57 interim was paid on the 9,000,000 ordinary prior to the rights issue of £4,500,000 which raised the capital to its present figure of £13,500,000. The amount set aside to fixed assets replacement reserve is stepped up by £400,000 to £1,800,000.

ENTWISTLE (OLDHAM), LIMITED, manufacturers of heat, creep, and stainless-steel fittings, of Oldham (Lancs)—The entire issued capital of the company has been acquired by Armitage & Rigby (Holdings), Limited, cotton manufacturers, of Manchester.

JOB WHEWAY & SON, LIMITED, manufacturers of pulley-block chains, of Walsall (Staffs)—A dividend of 20 (30) per cent. is being paid for the year ended September 30, 1958. There is a net profit of £35,836 (£42,031), before taxation of £21,600 (£22,830).

KITCHEN & WADE, LIMITED, manufacturers of drilling, boring, and honing machines, of Halifax (Yorks)—There will be an extra-ordinary meeting on January 5 to consider reducing the capital by a repayment of 2s. 6d. per 4s. ordinary, and capitalization of £309,375 in restoring the shares to 4s. each.

CRONITE FOUNDRY COMPANY, LIMITED—A final dividend is announced of 12 per cent., making 18 per cent. for the year ended September 30, 1958, on a capital doubled by a scrip issue representing an effective increase of 3 per cent. Net profits are £67,847, against £65,636, after depreciation of £7,309 (£7,317) and tax of £75,160 (£72,042).

JOHN FOWLER & COMPANY (LEEDS), LIMITED, manufacturers of diesel crawler tractors, etc., of Leeds—There is no dividend on the ordinary for the year ended September 30, 1958, as in the previous year. A net loss of £13,720 (profit of £4,198) was sustained after depreciation of £44,580 (£37,910) and after crediting unrequired tax of £2,344 (£5,729 tax charged).

DUNSWART IRON & STEEL WORKS, LIMITED—No final dividend is being paid for the year ended June 30, 1958, making a total of 6 (15) per cent. Working profit was £256,339 (£185,958). The directors state that all of the new plant is expected to be operating by June 30 next. Plans to provide the balance of the cost of the programme and to convert short-term loans into long-term borrowings are being considered.

R. A. LISTER & COMPANY, LIMITED, agricultural, electrical, and general engineers, etc., of Dursley (Glos)—An increased final dividend of 10 (7½) per cent., making 12½ (10) per cent. for the year ended September 30, 1958, is being paid on the £3,640,000 ordinary capital. Group profit, subject to audit, is £1,074,972 (£1,079,136). Net profit is £488,120 (£475,939) after tax of £586,852 (£603,197).

F. FRANCIS & SONS (HOLDINGS), LIMITED, manufacturers of metal containers and steel drums, etc., of London, S.E.13—The offer to acquire the 1,800,000 ordinary 1s. shares of Sagar-Richards, Limited, die-casters and engineers, of Luddendenfoot (Yorks), on the basis of one 5s. Francis ordinary and 1s. 8d. cash for every five Sagar ordinary, has been accepted to the extent of 99.99 per cent. F. Francis & Sons has also completed the acquisition of all the issued capital of Glasgow Engineers, Limited.

AIRSCREW COMPANY & JICWOOD, LIMITED—Propeller and ventilating-fan manufacturers, etc., of Weybridge (Surrey)—The scheme of arrangement involving the reduction of capital has been approved by the court. In accordance with the British Match Corporation's recent offers, Airscrew thus becomes a wholly-owned subsidiary of that company. Preference holders will receive £12 British Match 5½ per cent. preference for £11 Airscrew stock, and ordinary holders £1 British Match ordinary for seven Airscrew 2s. units.

VILLIERS ENGINEERING COMPANY, LIMITED—Poor trading has continued into the current financial year, says the chairman, Mr. L. W. Farrer, but there have been recent signs leading the board to anticipate improved trading in the near future. The merging of J. A. Prestwich Industries, Limited, within the group has been proceeding satisfactorily. Group net profits, including those of a full year of J. A. Prestwich Industries, were £181,380 (£143,084) in the year ended July 31, 1958.

1908 1958

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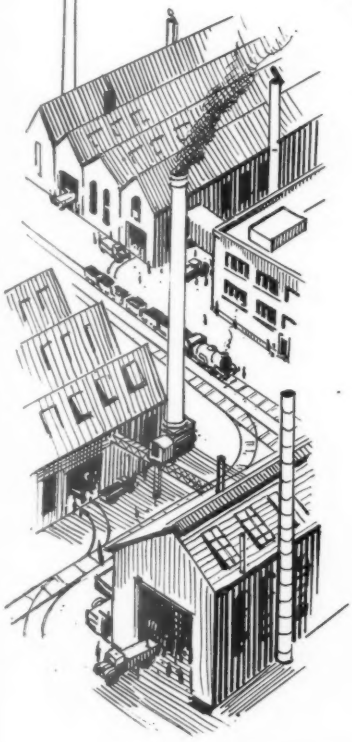

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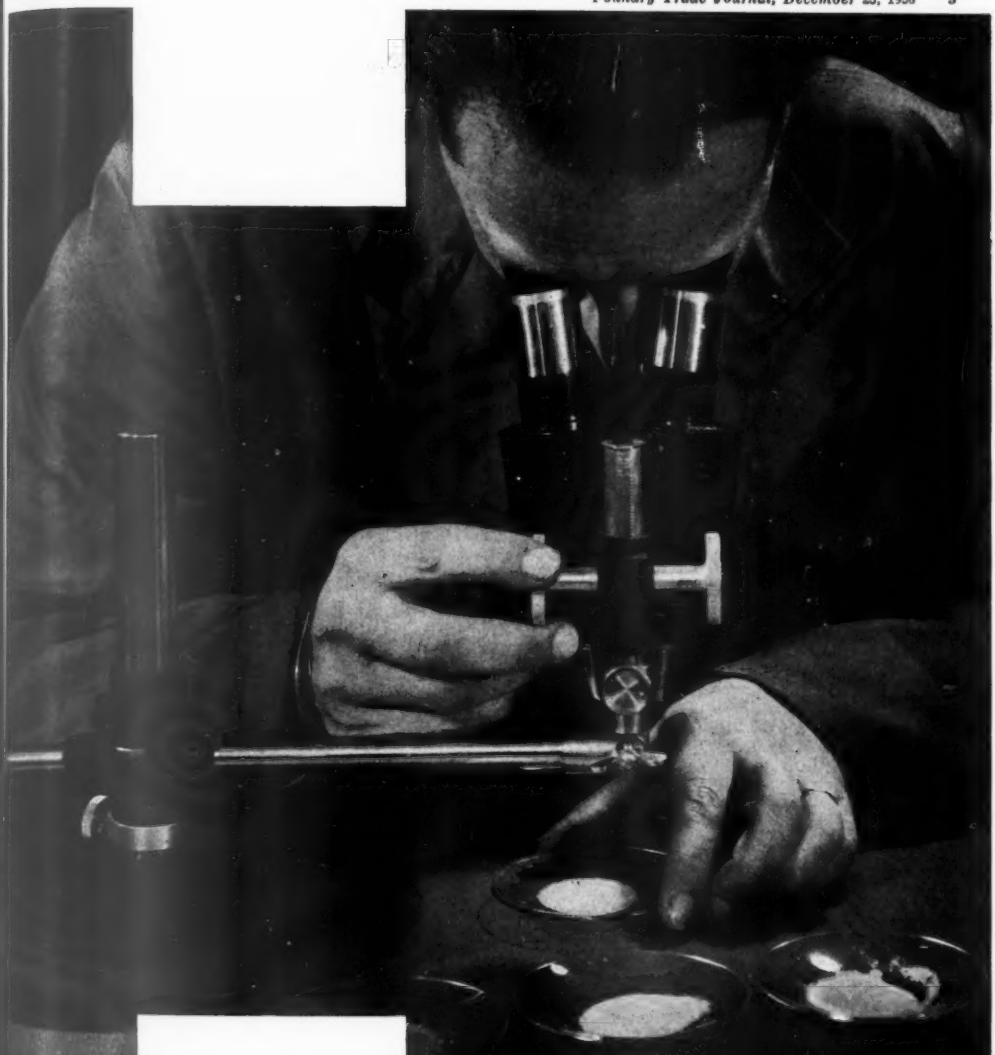

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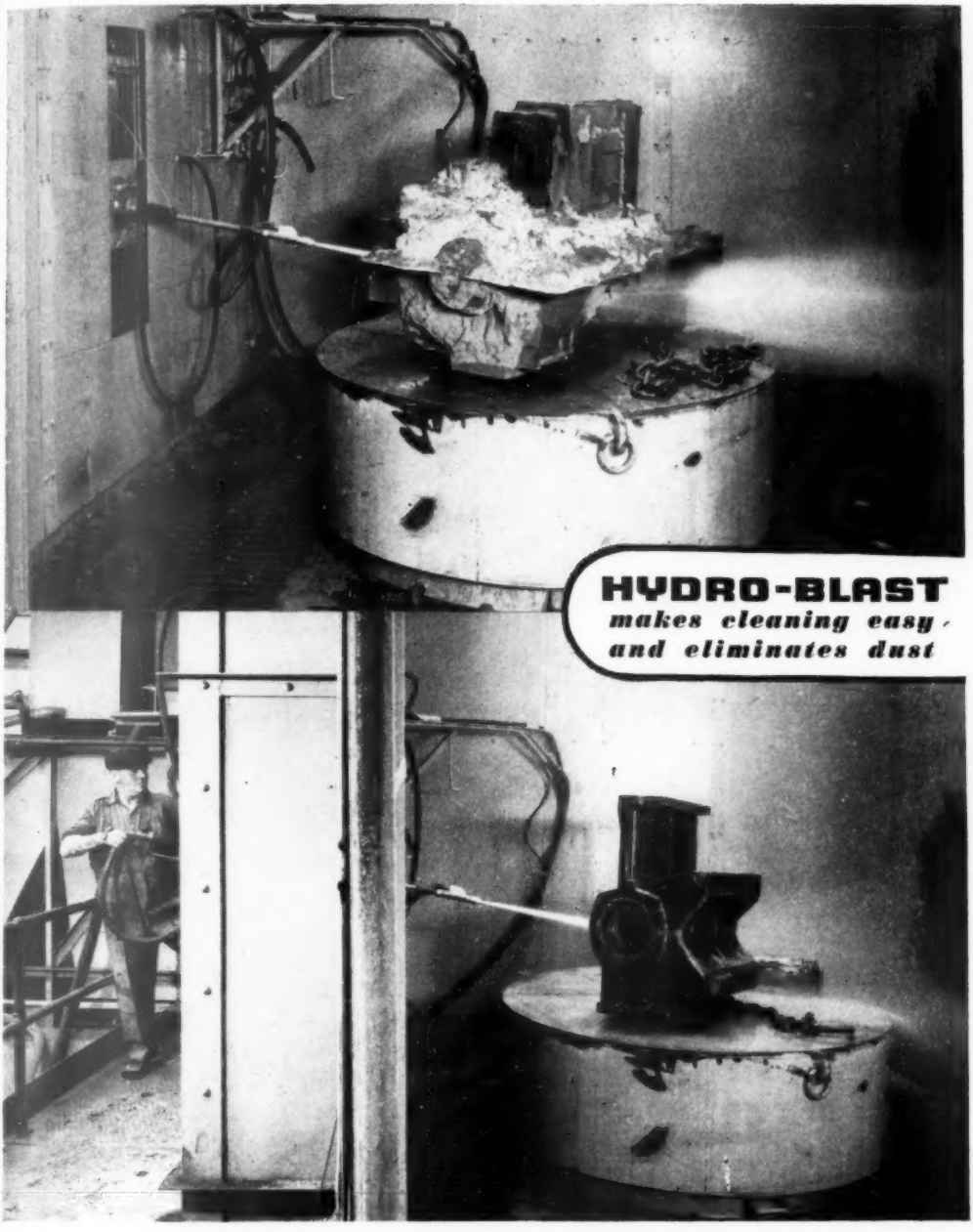

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Above:

View showing Wet type Spark Arresters with Inspection Platform serving 17-ton per hour Cupolas.

Left:

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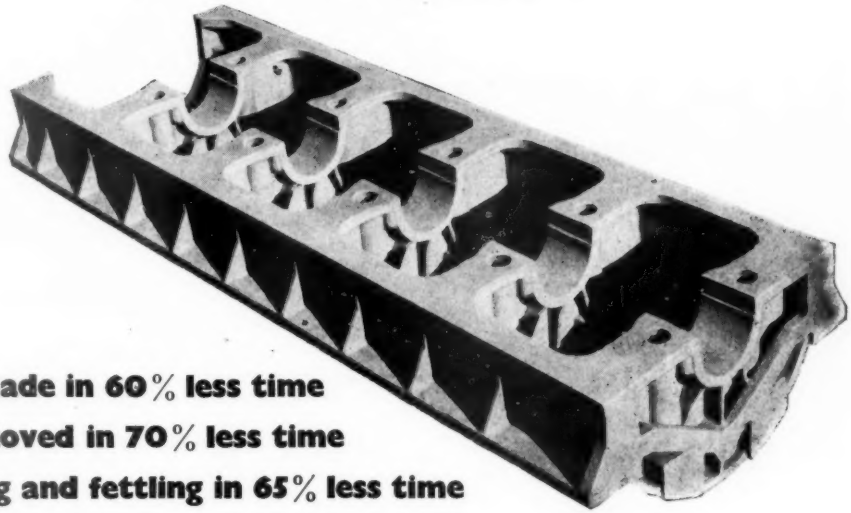

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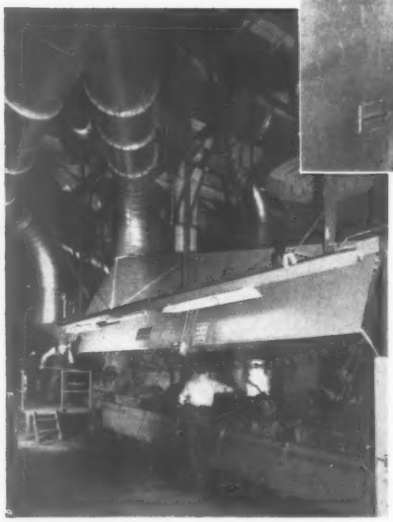
HOLMES—SCHNEIBLE

system for dust collection and control

Exhaust hoods at the clamps off and castings removal stations. Photographs reproduced by permission of the Ford Motor Co. Ltd



The Holmes-Schneible System installed at the new Thames Foundry of the Ford Motor Co. Ltd., removes more than half a million cubic feet of dust and fume laden air per minute, thus ensuring optimum working conditions twenty-four hours per day. In addition over 200,000 cubic feet of clean air per minute are supplied at certain points as 'compensating air' to maintain the foundry heating balance

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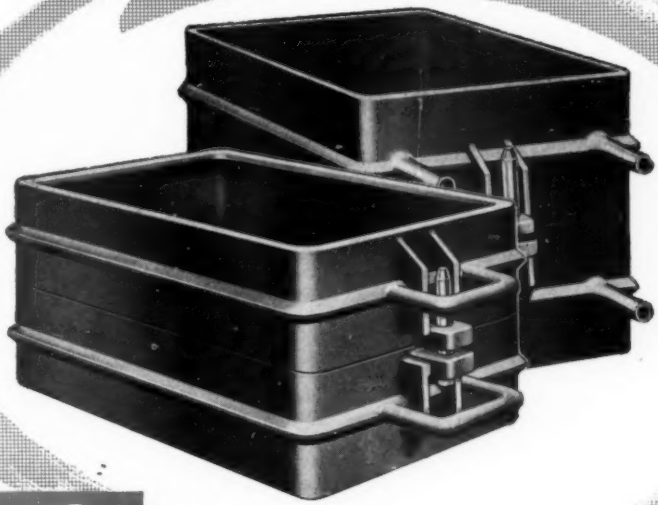
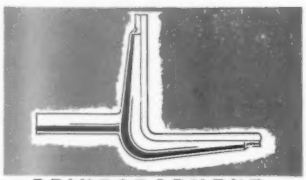
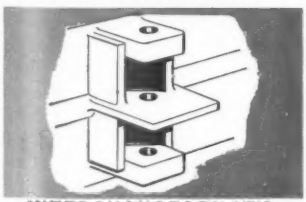


STRENGTH



REINFORCEMENT



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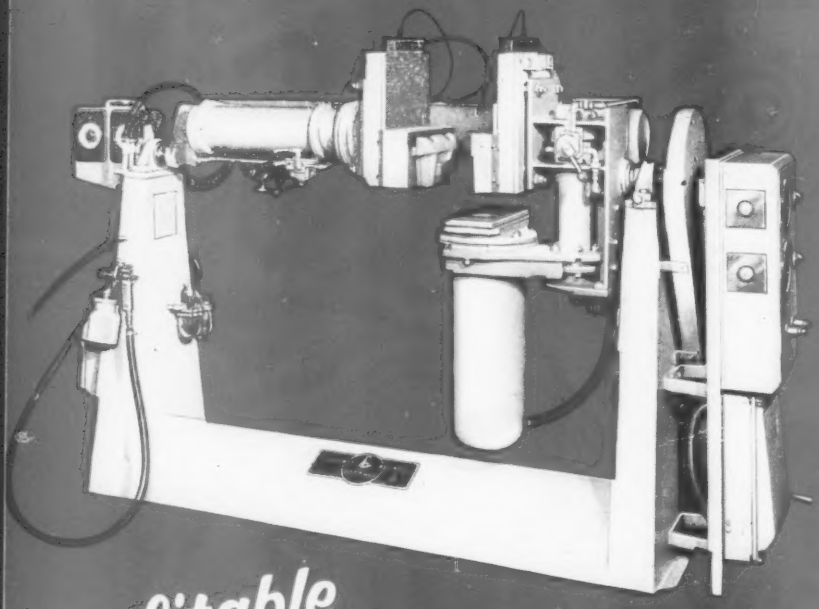

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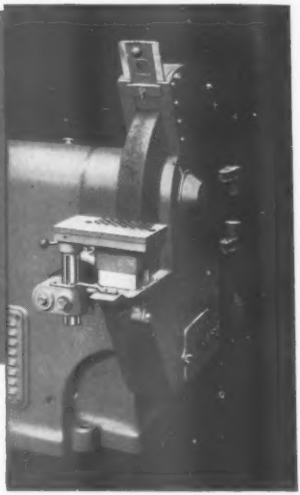

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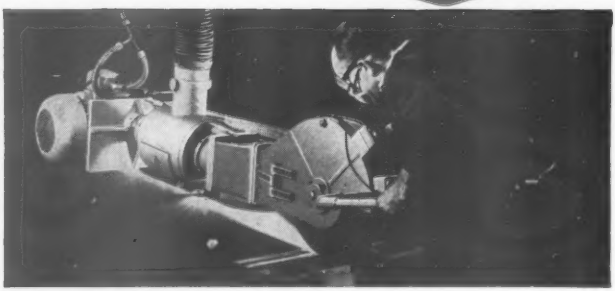

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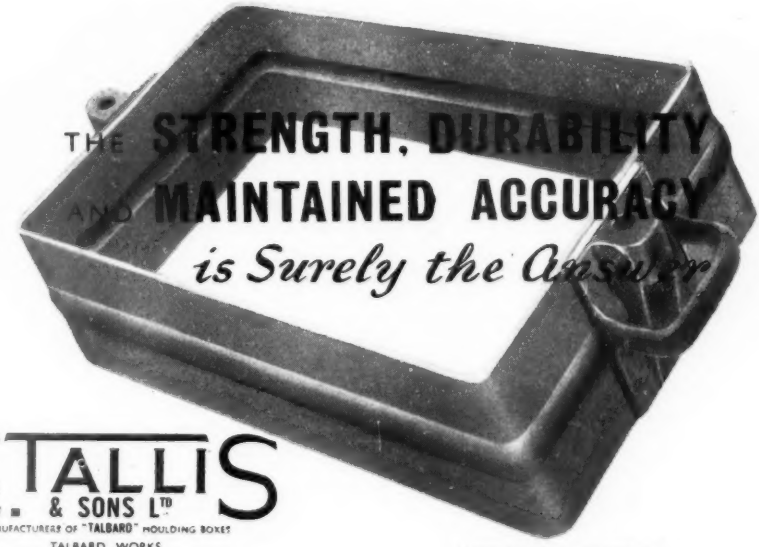

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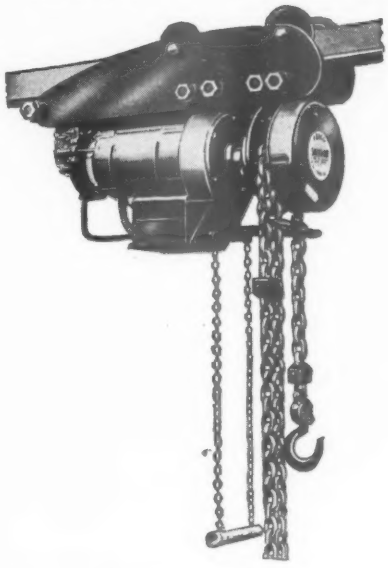

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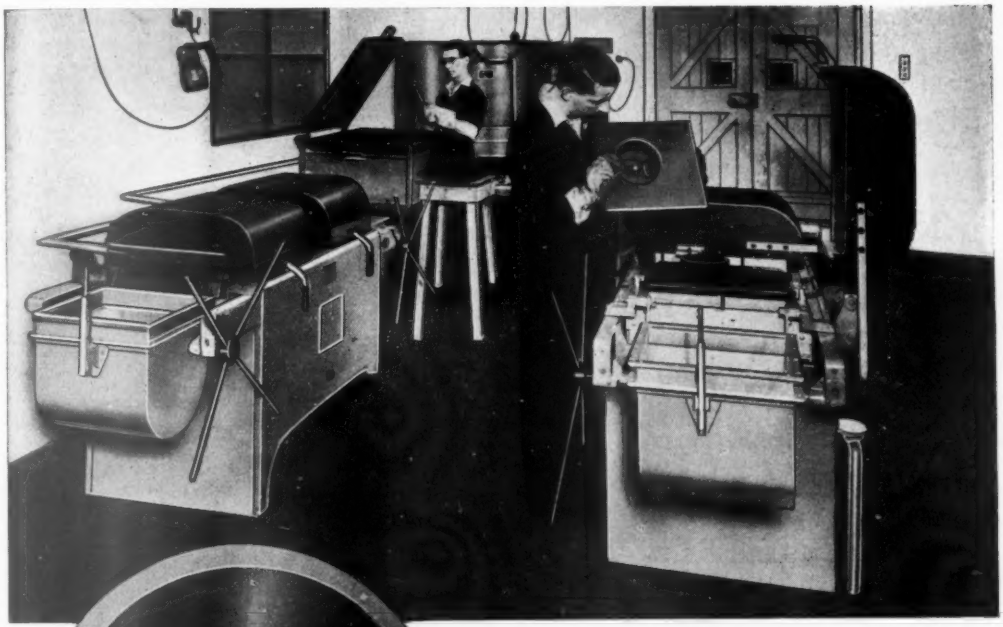

Polygram Shell Moulding machines installed at George Blackburn & Sons Ltd., Nottingham (A member of the Bentley Group).

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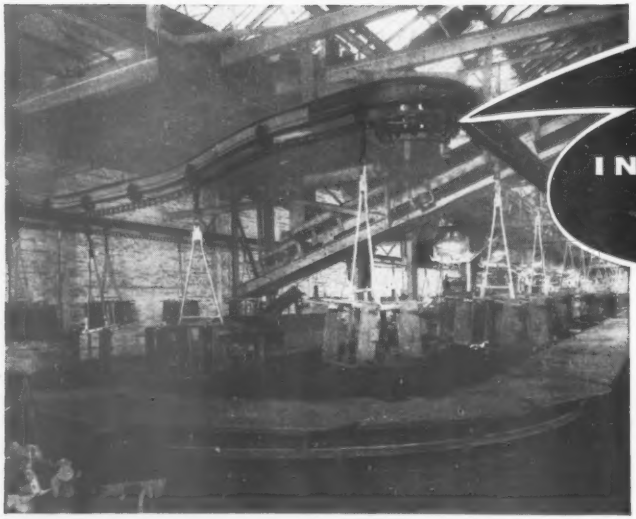

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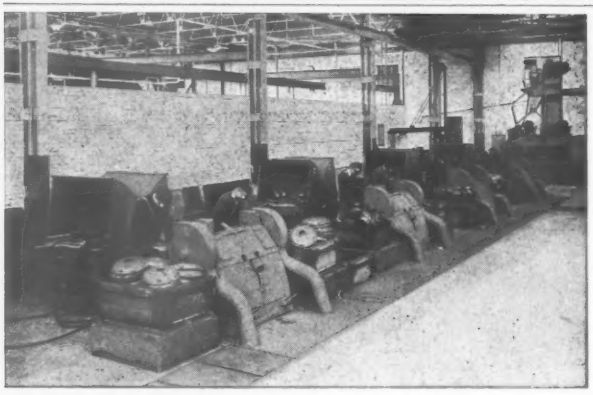

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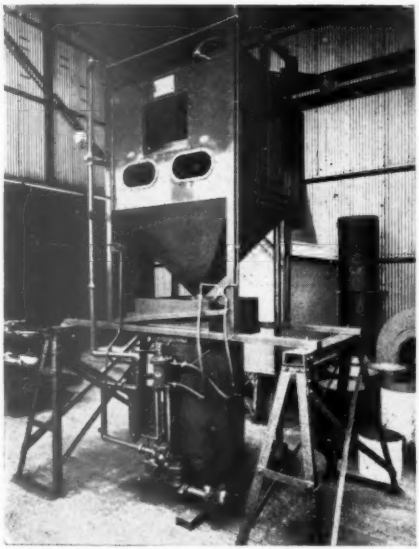

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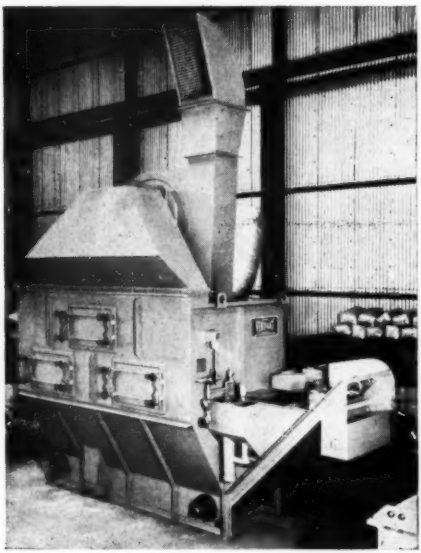

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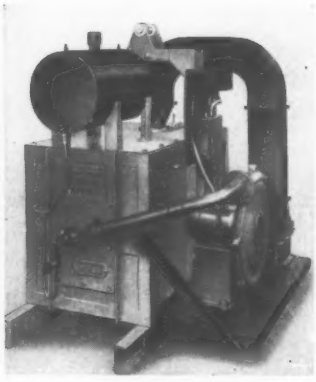

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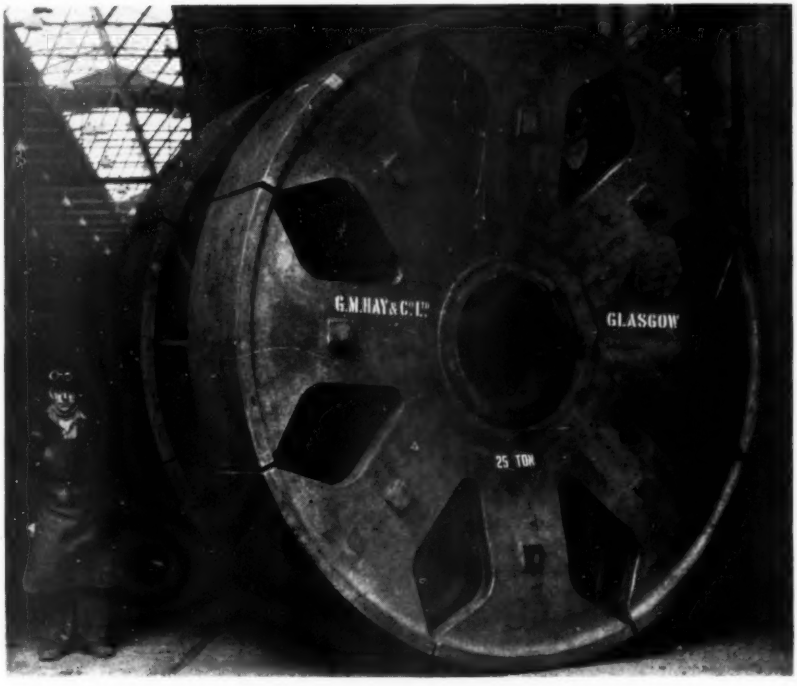

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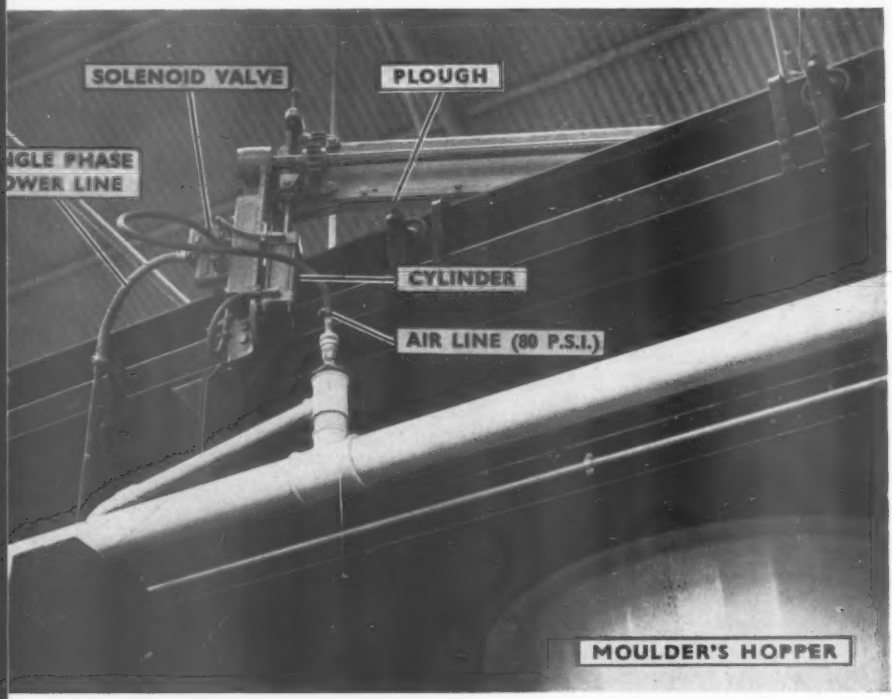

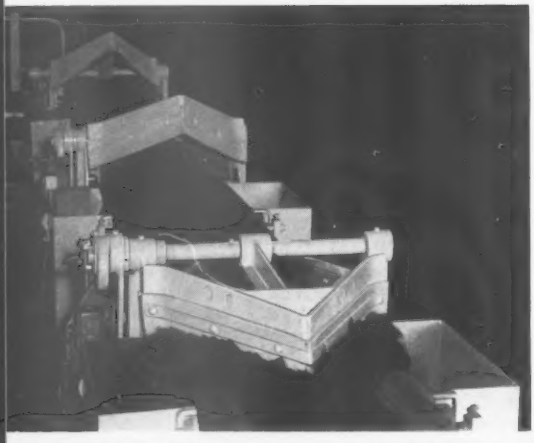

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May 12th, 1958.

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Automatic Sand Ploughs.

We are extremely pleased with the performance of your Automatic Sand Plough installation at our Lincoln Works, Messrs. Harrison & Co., (Lincoln).

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We are pleased to be able to tell you that based on our experience at Harrisons, we have decided to install this equipment in our new mechanised foundry at Derby, and are considering its possible application to another existing mechanised plant.

Yours sincerely,

F. D. Ley.

Managing Director.

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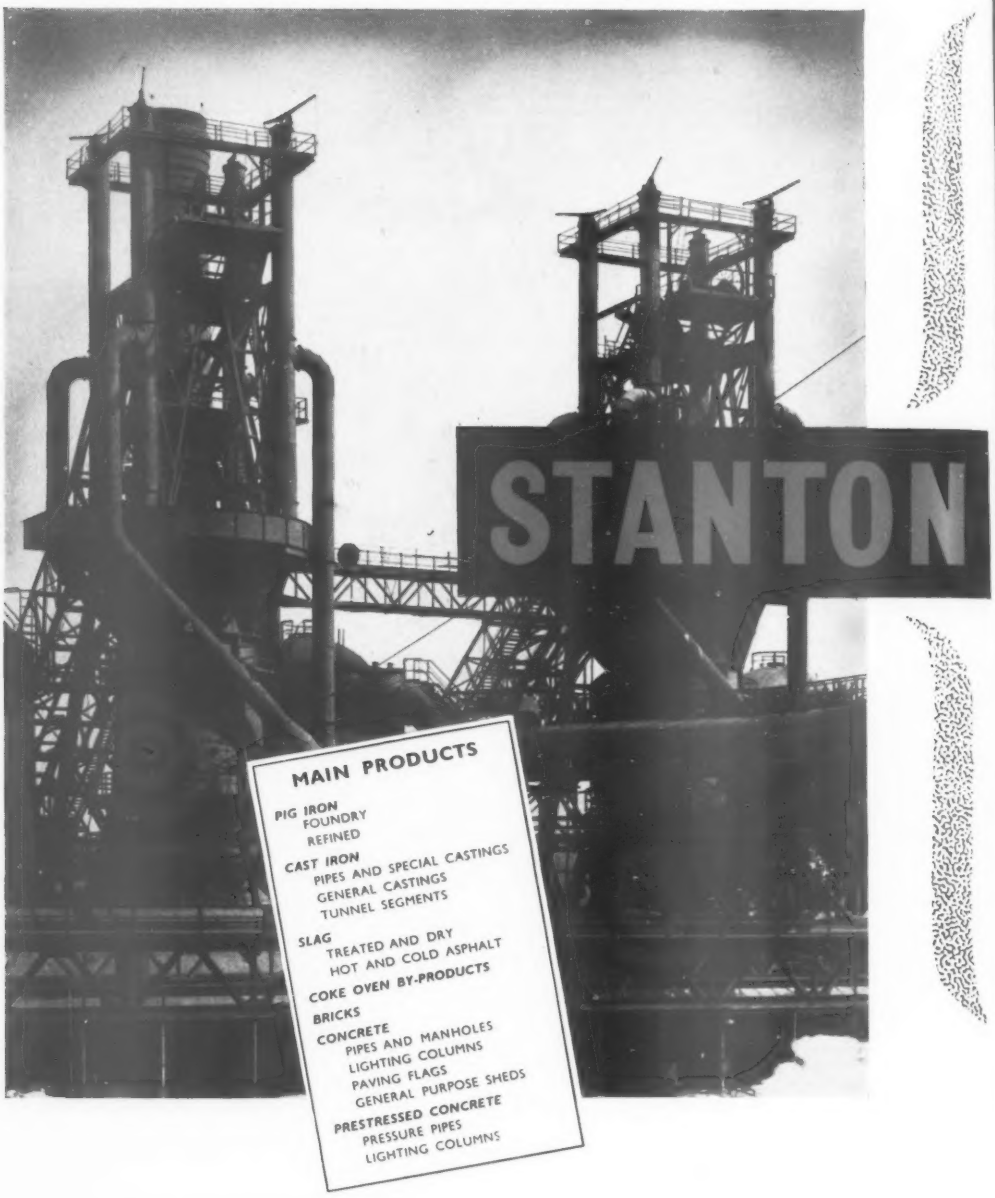

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	Total Carbon	3·4% min.
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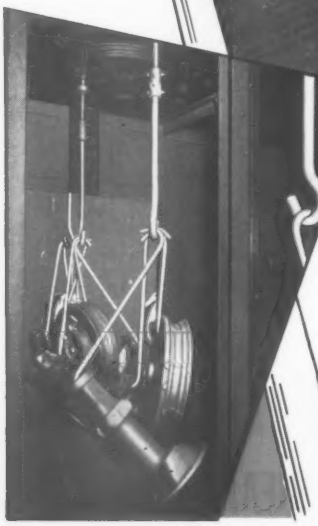

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One of two Overhead Monorail Conveyor Abrasive Cleaning plants recently installed in the new foundry at the Ford Motor Co. Ltd., for cleaning tractor and commercial vehicle components. The machine is equipped with six centrifugal blast units, which give complete cleaning coverage to the heavily loaded conveyor hangers passing through the cabinet.

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FOUNDRY FOREMAN, A.M.I.B.F., desires position, experienced in high duty cast iron and copper base production, dry sand, loam and shell moulding and CO_2 process. Box FF379, FOUNDRY TRADE JOURNAL.

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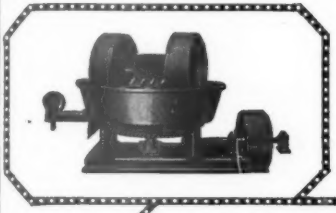

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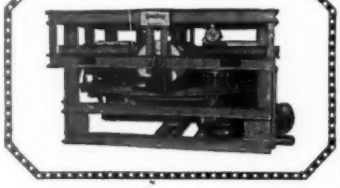

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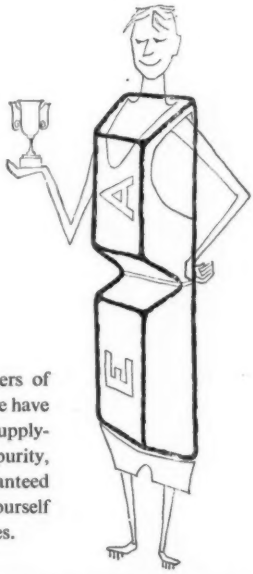

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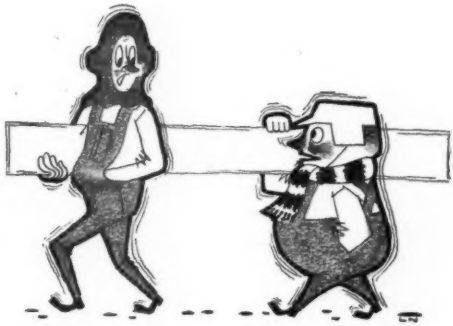

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INDEX TO ADVERTISERS

	PAGE NOS.
Acrow (Engineers), Ltd.	—
Adaptable Moulding Machine Co., Ltd., The	—
Air Control Installations Ltd.	—
Air Impellor & Engineering Co.	—
Albion Pulverising Co., Ltd.	—
Allan, John, & Co. (Glenpark), Ltd.	21
Albertuswerke	—
Alldays & Onions, Ltd.	—
Allen West & Co., Ltd.	—
Alley & MacLellan, Ltd.	—
Anderson-Grice Co., Ltd.	—
Annealers, Ltd.	—
Anglardia, Ltd.	—
Armstrong Whitworth (M.I.), Ltd.	—
Armstrong Whitworth & Co. (PNEU. Tools), Ltd.	—
Ashworth Ross Co., Ltd.	—
Aske, Wm., & Co., Ltd.	4
Associated Lead Manufacturers, Ltd.	—
Atlas Copco (G.B.), Ltd.	—
Atlas Preservative Co., Ltd.	—
Atmospheric Control, Ltd.	—
August's, Ltd.	36
Austin, E., & Sons, Ltd.	45
Badische Maschinenfabrik A.-G.	—
Bairds & Scottish Steel, Ltd.	—
Baker, Perkins, Ltd.	—
Bakelite, Ltd.	—
Ballard, F. J., & Co., Ltd.	—
Ballinger, J. L. H., Ltd.	—
Beacon Machine Tools, Ltd.	—
Benjamin Electric, Ltd.	—
Berk, F. W., & Co., Ltd.	—
Betts & Broughton, Ltd.	—
Bilston Shot & Grit Co., Ltd.	—
Bilston Stove & Steel Truck Co., Ltd.	—
Birkett, F. W., Ltd.	—
Birlec, Ltd.	48
Blackwells Metallurgical Works, Ltd.	—
Boydell, E., & Co., Ltd.	—
Bradbury, John, & Co. (Stockport), Ltd.	—
Bradley & Foster, Ltd.	6
British Acheson Electrodes, Ltd.	—
British Aero Components, Ltd.	—
British Electrical Repairs Ltd.	—
British Electrical Development Assoc.	—
British Foundry Units, Ltd.	—
British Industrial Sand, Ltd.	—
British Iron & Steel Federation	—
British Moulding Machine Co., Ltd.	47
British Oxygen Co., Ltd.	—
British Ronceray, Ltd.	—
British Rototherm Co., Ltd.	—
British Shotblast & Engineering Co., Ltd.	44
British Thomson-Houston Ltd.	—
Broadwell Engineering, Ltd.	24
Broom & Wade, Ltd.	791
Brummer Ltd.	—
Budd Co., The	—
Burn, John, & Co. (B'ham), Ltd.	—
Carborundum Co., Ltd.	—
Catalin Resins, Ltd.	—
Cawood Wharton & Co., Ltd.	44
Chalmers, E., Co., Ltd.	—
Chapman & Smith, Ltd.	—
Ciba (A.R.L.), Ltd.	—
City Casting & Metal Co., Ltd.	—
Clayton Crane & Hoist Co. Ld.	—
Cohen, Geo. Sons & Co., Ltd.	—
Coleman-Wallwork Co., Ltd.	12
Combustion Chemicals, Ltd.	43
Consolidated Pneumatic Tool Co., Ltd.	—
Constructional Engineering Co., Ltd., The	—
Controlled Heat & Air, Ltd.	—
Cooke, Bailey, Ltd.	40
Cooper & King, Ltd.	—
Cox & Danks, Ltd.	—
Crockett Lowe, Ltd.	—
Crooke & Co., Ltd.	—
Cumming, Wm., & Co., Ltd.	14 & 15
Cupodel, Ltd.	—
Cuxson Gerrard & Co., Ltd.	—
Dallow Lambert & Co., Ltd.	—
Davis, Vincent, Glazes, Ltd.	—
Derby & Co., Ltd.	—
Distillers Co., Ltd., The	—
Donovan Electrical Co., Ltd.	—
Dowler, H. J., Engineers & Pattern Makers, Ltd.	42
Dowson & Mason, Ltd.	—
Dunford & Elliott, Ltd.	—
Durrans, James, & Sons, Ltd.	29
Dustraction, Ltd.	—
Dustuctor Co., Ltd.	—
Eisenwerke-Wülfel	—
Electric Furnace Co., Ltd.	—
Elliott, E., & Co., Ltd.	—
Escol Products, Ltd.	—
Evans, James, & Co., Ltd.	44
Evans, Roy, M.I.B.E.	—
Evans, Stanley N., Ltd.	—
Eyre Smelting Co., Ltd.	43
F. & M. Supplies, Ltd.	43
Felco Hoists, Ltd.	22
Fesiente, Ltd.	—
Fischer, George, Ltd.	—
Fisher-Foundries, Ltd.	—
Flextol Engineering Co., Ltd.	—
Floodgate Steel Fabricating Co., Ltd.	—
Fordath Engineering Co., Ltd.	9
Foundry Consulting Co., Ltd.	—
Foundry Equipment, Ltd. 30&31	
Foundry Mechanisations (Bailiol), Ltd.	—
Foundry Plant & Machinery, Ltd.	—
Foundry Services, Ltd.	2
Foundry Suppliers, Ltd.	5
Foundry Trades Equipment Supplies Association, Ltd.	—
Foxboro-Yoxall, Ltd.	—
Franklin Furnace, Ltd.	—
Fuel & Metallurgical Processes, Ltd.	—
Fullers' Earth Union, Ltd., The	—
Gadd, Thos.	42
Gas Council	—
General Electric Co., Ltd.	—
General Refractories, Ltd.	—
Gietart	—
Glenboig Union Fireclay Co., Ltd.	—
Gliksten, J., & Son, Ltd.	41
Glostics, Ltd.	—
Goodyear Tyre & Rubber Co., Ltd.	—
Green, Geo., & Co.	—
Guest Keen Iron & Steel Co., Ltd.	18
G.W.B. Furnaces, Ltd.	—
Hall & Rice, Ltd.	—
Harborough Construction Co., Ltd.	—
Hargraves Bros. (Manchester), Ltd.	—
Harvey & Longstaffe, Ltd.	—
Hedin, Ltd.	—
Heneage Metals, Ltd.	—
Hepburn Conveyor Co., Ltd.	25
Heywood, S. H., & Co., Ltd.	—
High Speed Steel Alloys, Ltd.	—
Holmes, W. C., & Co., Ltd.	10
Hooker, Norman (Foundry Supplies), Ltd.	42
Hooker, W. J., Ltd.	—
I.C.I., Ltd.	—
Incandescent Heat Co., Ltd.	—
Industrial Fuel Efficiency Exhibition	—
Industrial Impregnations, Ltd.	—
Industrial & Metallurgical Equipment, Ltd.	—
Industrial Products, Ltd.	45
Ingersoll-Rand Co., Ltd.	—
Jackman, J. W., & Co., Ltd.	—
Jacks, Wm., & Co., Ltd.	37
Jaconello, Ltd.	—
Keith-Blackman, Ltd.	—
Kodak, Ltd.	—
Lafarge Aluminous Cement Co., Ltd.	—
Laidlaw, Drew & Co., Ltd.	—
Lakin, A., & Son, Ltd.	41
Law, Wills & Co., Ltd.	—
Lazarus, Leopold, Ltd.	789
Lees Hall & Sons, Ltd.	—
Leicester Lovell & Co., Ltd	—
Lennox Foundry Co., Ltd.	—
Levy, B., & Co. (Patterns) Ltd.	42
L.M.S. Products, Ltd.	—
Lones, Joseph, Laboratories	—
Lord, E. S., Ltd.	—
Luke & Spencer, Ltd.	16
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Macnab & Co., Ltd.	—
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Measurement Industrial Meters	—
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Metals & Equipment (Wolverhampton), Ltd.	—
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Midland Fan Co., Ltd.	—
Midland Heating & Ventilation Co., Ltd.	—
Midland Monolithic Furnace Lining Co., Ltd.	42
Minnesota Mining & Manufacturing Co., Ltd.	—
Mirrlees Watson Co., Ltd.	—
Modern Furnaces & Stoves, Ltd.	28
Mole, S., Ltd.	—
Molineux Foundry Equipment Ltd.	27
Mond Nickel Co., Ltd.	—
Monometer Manufacturing Co., Ltd.	—
Monsanto Chemicals, Ltd.	—
Morris, Herbert, Ltd.	—
Muir, Murray & Co., Ltd.	—
New Conveyor, Ltd.	—
Newman Industries, Ltd.	—
Newton Chambers & Co., Ltd.	—
Newton Collins, Ltd.	24
Newman Hender & Co., Ltd.	37
Newton Sales Co., Ltd.	—
Nicholl & Wood, Ltd.	—
Norris Equipment, Ltd.	—
Ormerod, R. E., Ltd.	—
Palmer Aero Products, Ltd.	—
Pantin, W., & Co., Ltd.	—
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Pickard, W., & Co., Ltd.	—
Platt Metals, Ltd.	—
Pneulec, Ltd.	7
Polford Engineering Co.	—
Polygram Castings Co., Ltd.	23
Pontifex, H.	—
Precision Presswork Co., Ltd.	44
Premo Pattern Co.	—
Price, J. T., & Co., Ltd.	—
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Roper, E. A., & Co., Ltd.	8
Rowland, F. E., & Co., Ltd.	26
Rule & Moffat	—
Rustless Iron Co., Ltd.	—
Safety Products, Ltd.	—
St. George's Engineers, Ltd.	—
Scientific Automation Co. Ltd.	—
Scintilla, Ltd.	—
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Smith, A., & Co.	40
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Spear & Jackson, Ltd.	—
Spencer & Halstead, Ltd.	—
Spermolin, Ltd.	3
Stansby, W., & Co., Ltd.	—
Stanton Ironworks Co., Ltd. The	32 & 33
Staveley Iron & Chemical Co., Ltd.	—
Steele & Cowlishaw, Ltd.	—
Stein & Atkinson, Ltd.	—
Stein, John G., & Co., Ltd.	20
Sterling Foundry Specialties, Ltd.	11
Sternol, Ltd.	—
Sturtevant Engineering Co., Ltd.	—
Suffolk Iron Foundry (1920), Ltd.	—
Swynnerton Red Moulding Sand	—
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Tame Valley Alloys, Ltd.	—
Tangyes, Ltd.	—
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Temple Instruments, Ltd.	—
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Thomas, G. & R., Ltd.	—
Thompson, John, Instrument Co., Ltd.	—
Tilghman's, Ltd.	13 & 34
Tweedy, George & Co. Ltd.	—
Union Carbide, Ltd.	—
United State Metallic Packing Co., Ltd.	—
United Steel Co., Ltd.	—
Universal Pattern & Precision Engineering Co., Ltd.	17
Vaughan Crane Co., Ltd.	—
Wadkin, Ltd.	—
Wal-Met Alloys Co.	—
Walker, I. & I., Ltd.	—
Ward, Thos. W., Ltd.	1
Waring Bros.	—
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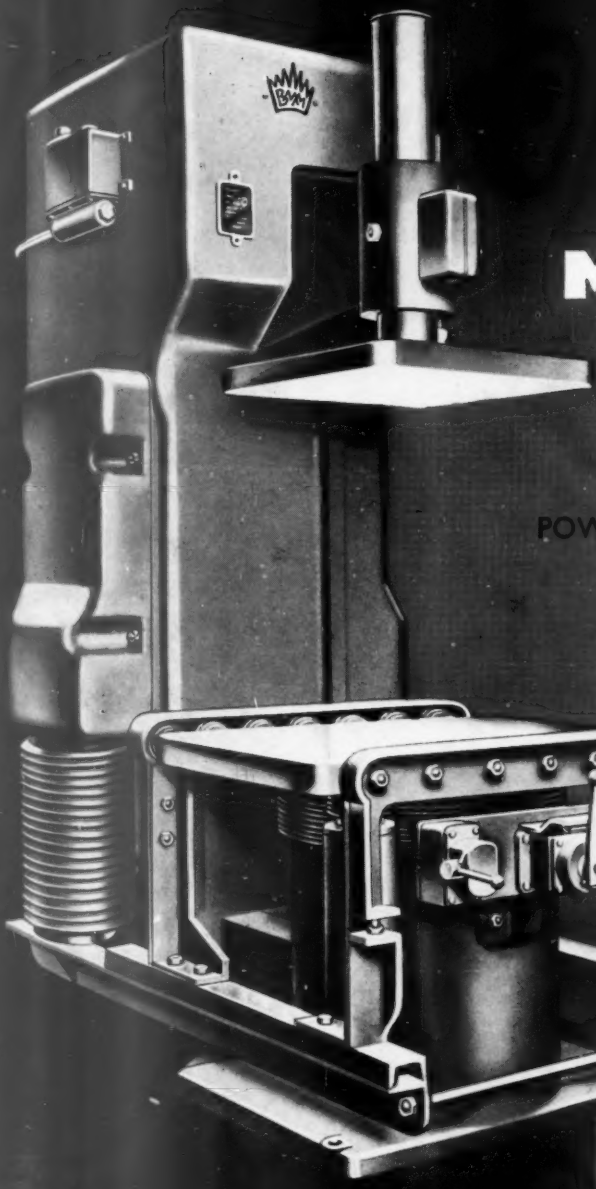

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